

**Independent
guide to the
BBC MICRO!**

THE MICRO USER

*Volume 2
Number 10
December 1984
£1.25*

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MOUSE!**

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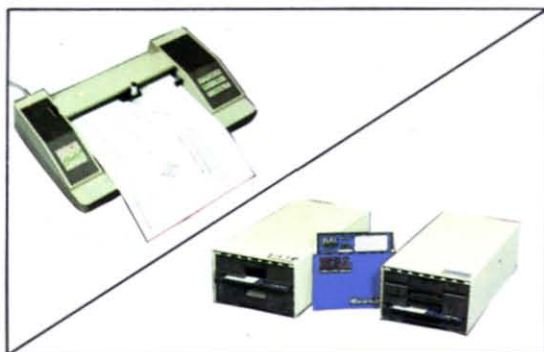
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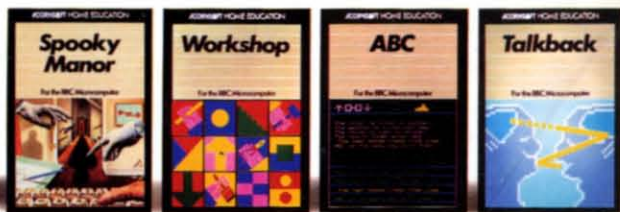
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ACORNSOFT



Vol. 2 No. 10 Dec 1984

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Published by:
Database Publications Ltd,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

Subscription rates for
12 issues, post free:

£15 - UK
£15 - Eire (IR £18)
£20 - Rest of world
(surface)
£65 - Rest of world
(airmail)

ABC 68,328
January-June 1984

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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The Micro User is an independent publication and neither the BBC nor Acorn Computers Ltd are responsible for any of the articles in this issue or for any of the opinions expressed.

News trade distribution:
Europress Sales and Distribution Limited,
11 Brighton Road, Crawley, West Sussex
RH10 6AF. Circulation 0293 27053.

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Keep in touch with all the latest happenings in the fascinating world of the BBC Micro.

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Delve into the darkest depths of a deadly diamond mine with our intrepid hero Bill.

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THE MICRO USER

is famed for its reviews . . . and this month's issue shows why!

Software scene

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In-depth analyses of 16 games, utilities and educational programs, plus 17 "quick spins".

Hardware scene

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Our experts scrutinise four new add-ons: Fast tape system Ultra Drive, Softlife eprom programmer, Altair's ROM/RAM board and compare Epson's RX/FX printers.





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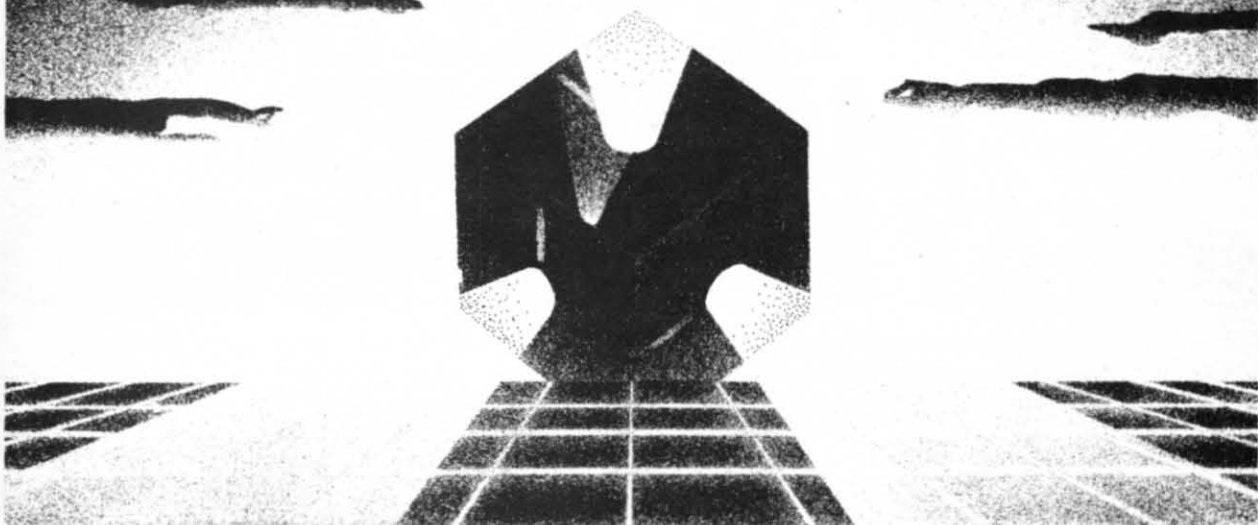
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memo-calc

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Database/calcsheet program which allows up to 255 columns. The number of rows is automatically set from 5 to over 1000 depending on the columns declared. Both numeric and alphanumeric data can be stored in any cell and can be of any length up to 255 characters. There are a multitude of uses for this program from accounts to diaries, club or personnel records etc, and is probably the one program that we all need. MODE7

107a Manual for MEMO-CALC included free otherwise £2.00 (0% VAT)

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102 CASHBOOK £11.95 B C/D

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MODE7

102d CASHBOOKd £19.95 B D

SECOND CHOICE This version of the above program uses random access disc files and can hold up to 1250 entries on 100K discs and up to 2500 on 200K discs. There is sophisticated protection against unauthorised use built in. MODE 7

102f ACCOUNT £29.95 B D

THIRD CHOICE This version of the above program uses random access disc files and can hold up to 1100 entries on 100K discs, and up to 2250 on 200K discs. Included is a choice of CASH/BANK or VAT/BANK headings. Over 830000 possible accounts combinations. Ledger sheets and summaries can be printed as well as full accounts. The latest balance is available at any time. This program is only available on disc. MODE 7

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Available on cassette for the ELECTRON and cassette or disc for the BBC Micro using any operating system.

CRIBBAGE £7.95 + VAT

Cribbage is played with a full pack of 52 cards. An ace always counts as '1'; a Jack, Queen or King counts as '10' when its value is added to others but ranks in normal sequence when scoring runs.

There are usually two players, and the most common forms of the game are the five-card and six-card. The winner of the game is the first to score 61 or 121 respectively.

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NEW*

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- INPUT is a routine included on the disc which will allow you to write utilities for accessing your data and tailored specifically to your needs.
- TUBE compatible with the 6502 second processor.
- Comprehensive manual and tutorial. All timings and sizes are relative to ACORN DFS. Compatible with ACORN DFS, WATFORD 1.3 and latest AMCOM DFS SERIES B.
- ORIGINAL USERS send your disc plus £3 for up grade.

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DISC

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REPLICA II transfers 'LOCKED' programs, programs loading as files, programs that load below &EOO, those with up to 6 sections and those up to &6E in length eg adventure programs. No waiting for 6 minutes whilst adventure programs load.

REPLICA II is very easy to use. The user enters a name, how many sections and whether CHAIN, RUN or LOAD to load the first section. Press play and let the program do the rest, even a menu. Think how much it will cost you to buy just 1 disk version of your favourite program—REPLICA II which will hold up to 16 programs, limited only by the disk capacity.

FX 80 PRINTER DRIVER £12.00

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DISC

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DISCDEX is only suitable for discs with 31 file names as in the standard ACORN system. It is not suitable for double density interfaces.

NEW

ONESHOT: £12.00 DISC

- Full feature trace utility.
- Single step through BASIC program or halt at user determined interval.
- Print line number prior to execution.
- Obey fixed instructions before executing a line.
- Trace window allows screen to be seen whilst tracing execution.
- "Printer only" will force trace output to a printer allowing full screen display.
- Ability to dynamically alter control of ONESHOT.
- ONESHOT can be configured to run in any area of memory.

ONESHOT is a 1.25kb machine code program which gives the user several powerful aids in debugging BASIC programs. These include the ability to SINGLE STEP through the BASIC code of the target program, stopping the processing at specified points and comprehensive trace functions of the variables used by the target program.

A very powerful option allows the user to enter a command string into function key 0 and instruct ONESHOT to obey this command BEFORE each line is executed e.g. *KEY0 PRINT X% M will print the value of X% before executing each line. This is a very simple example and it is possible to do much more complex things including printing the value of a variable only when it changes or when it reaches a certain value or falls within a certain range. This option can also be used to dynamically alter ONESHOT as it is working. The power of this option is only limited by the users ingenuity. In addition to ONESHOT the disc also contains 3 very useful function key routines. The first will search for any DEFPROC or DEFFN and print the line numbers in which they appear together with the name of the procedure or function. The second will search for a specific procedure or function and print the line numbers containing it. The third routine will print out every active variable together with its present value. ONESHOT is not compatible with double density interfaces.

NEW

FUN HOUSE: £10.00 DISC

FUN HOUSE is a highly original suite of educational programs suitable for ages 3 to 13. The program is designed to encourage children to spell words which relate to objects found around the home. Animation and music are used to good effect and some highly original ideas are incorporated. Each room exercise is terminated with a warning item e.g. the lounge finishes with 'FIRE' which goes on to engulf the whole lounge. Tests with a newly hired 4 year old resulted in us having to prise him away from the keyboard after 2 hours. In that time he had gone from never having used a keyboard to finding the location of all the keys very quickly and entering the correct answer. He had thus started on the path to learning spelling and familiarised himself with the keyboard including the use of DELETE to correct his mistakes. Can you afford not to give your children the same start?

FUN HOUSE is not compatible with double density interfaces.

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Canon 110: Case/Cables all INCL £89

Canon 220: 400K (40/80 switching)

Case/Cables all INCL £149

N.B. These are state of the Art Disc Drives; Direct Drive
40 track 6mms Access/80 track 3ms Access.

SLIM CANON DISC DRIVES:

MODEL	SPECIFICATION OF EACH DRIVE
110	S/SIDED 40 TRACK 100K
210	D/SIDED 40 TRACK 200K
220	D/SIDED 80 TRACK 400K (40/80 TRACK SWITCHING)

- ▶ All **CANON** 40/80 switchable disc drives feature an on-board dual-colour LED on the front panel to show track mode selected. This is coupled with our own unique two-stage illumination, to give a clear operating status, as follows:
40 TRACK MODE: _____ LED GREEN
80 TRACK MODE: _____ LED RED
POWER ON: _____ HALF-ILLUMINATION (GREEN OR RED)
DRIVE SELECTED _____ FULL-ILLUMINATION (GREEN OR RED)
- ▶ Super-slim **CANON** drives, models 221 and the **SANYO** model 596D, are available with their own **custom-built secondary switching power supply**. This is safe, low in heat generation and excellent value for money.
- ▶ The **SANYO** disc drive is our latest acquisition in quality Japanese products. This is a "half-height" unit of standard dimensions.

DATA

DISC DRIVES

**FOR THE
BBC
MICRO**

SUPER-SLIM CANON DISC DRIVES:

MODEL: SPECIFICATION OF EACH DRIVE

221 D/SIDED 80 TRACK 400K
(40/80 TRACK SWITCHING)

SLIM SANYO DISC DRIVES:

MODEL: SPECIFICATION OF EACH DRIVE
596D D/SIDED 40/80 TRACK 400K

(40/80 TRACK SWITCHING)

All inclusive price list:

This means: disc drive + case + all power & data cables + U.K. carriage + utilities disc & manual + V.A.T.

MODEL:	CANON				SANYO
	110	210	220	221	596D
Formatted Capacity per drive on BBC Micro:	100k	200k	400k	400k	400k
Single Drive & Case:	£89	£99	£149	£199	£169
Single Drive & Case/P. Supply:	£114	£124	£174	£229	
Dual Drive & Case:	£184	£199	£279	£379	£319
Dual Drive & Case/P. Supply:	£214	£234	£309	£409	£349

Support:

Warranty: All disc drives sold by Chase Data Ltd. come with a full one-year warranty on parts & labour.

Non-warranty service: As THE experts in our field we can offer service on most makes of floppy disc drive.

Recalibration & Alignment ... £25 per unit inc. VAT. (parts extra). Phone for details: (Tel: 0784 38487)

Payment



Allow 21 days for delivery.

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By Phone: (Tel: 0784 38487)

**If you're involved with education,
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**THE
HI-TECHNOLOGY
AND
COMPUTERS
IN
EDUCATION
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**23-26 January, 1985
BARBICAN CENTRE, LONDON EC2**

**The face of education is
changing, monitors are replacing
blackboards, light pens are
replacing chalk.**

As an educationalist take an opportunity to get right up to date with everything that's new in high technology and computers in education. The new techniques aren't only for the science labs or computer classes, they cover all aspects of the schools curriculum, from geography to physical training.

This exhibition, the first of its kind, is a definitive showcase for both manufacturers and users alike. You can see the best the



world has to offer, compare specifications and collect literature away from the bustle of day to day activities.

Entrance is free to anyone working in education and over 18 years of age. Just clip the coupon below. (To be completely up-to-date, book into the series of half-day seminar/workshops organised alongside the exhibition in co-operation with the Micro-electronics Education Programme. For details of these and a booking form, tick the box on the coupon below.)

Timothy Collins,
Computer Marketplace (Exhibitions) Ltd.,
20 Orange Street,
London WC2H 7ED

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Please send me my free ticket(s) to the Hi-Technology and Computers In Education Exhibition,

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- ## ■ Faster interaction

■ Creative Graphics

■ Enhanced Programs

With the **AmX MOUSE**, from Advanced Memory Systems Ltd, the BBC Micro joins a new league of powerful user-friendly computers. Natural hand-eye co-ordination allows the **MUSE** to position the cursor quickly and accurately. Alternatively by moving the **MUSE** you can input specially written new software such as **ARTWORX**.

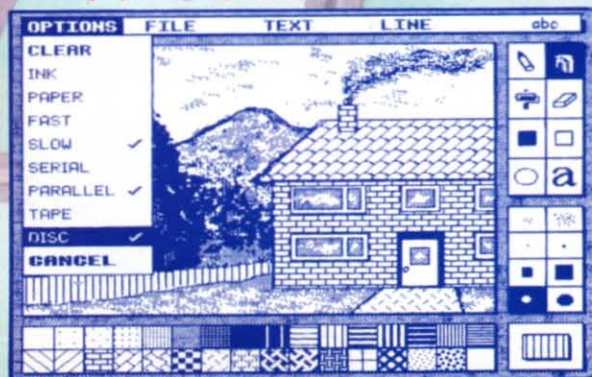
ARTWORX is a powerful graphics program allowing scope to produce amazingly vivid pictures and designs on your screen and printer. Simply point to any of the **ICONS** (small illustrations) and you select options of patterns and implements. Other options are offered by pull-down menus. All features can be activated using just the **MOUSE**.

The **AMX MOUSE** package includes **ARTWORK** and an **EPROM** with software to enable you to use the **MOUSE** with existing programs and also lets you use the **MOUSE's** versatility in your own software. Just plug the **MOUSE** into the user port on a **BBC Micro (model B)** and the **EPROM** into a spare sideways socket.

Now simply fill in the coupon and we will send you an AmX Mouse with ARTWORX with our full no quibble money back guarantee. OR phone 0925 602690/62907 for instant Access or Visa orders.



ARTWORX graphics program



Please send No _____ **AMX MOUSE** packages
(including **ARTWORX** and EPROM) at **£89.95** inc. VAT and P&P.
I enclose a cheque/PO for £ _____ or debit my credit card.

Card No.

☐ Visa
☐ Access

Name _____

Address _____

Signature _____ Date _____

(Please tick choice of media for **ARTWORX**) ☐ Cassette ☐ 3" Disc ☐ 5 1/4" Disc

**To: Advanced Memory Systems Ltd., Woodside Technology
Centre, Green Lane, Appleton, Warrington, WA4 5NG, England.**

SERIOUS SOFTWARE

FOR THE B.B.C. MICRO

From BEEBUGSOFT

SPELLCHECK II

NOW IN ROM and
up to 500% faster.



SPELLCHECK provides an automatic spelling check for letters or documents and is the ideal companion to WORDWISE or VIEW. It is menu driven, easy to use and allows unknown words to be added to the dictionary, ignored or re-spelt. A new corrected copy of the text may then be saved to disc.

SPELLCHECK I (On Disc)

SPELLCHECK I is supplied on two discs with a starting dictionary of 6,000 words. Separate versions are available for WORDWISE and VIEW. (When ordering please specify).

SPELLCHECK II (On Rom)

SPELLCHECK II is a completely new machine code program supplied in Rom. Operation speed is up to 5 times faster than SPELLCHECK I and larger pieces of text may be held in memory. The same version will also check both VIEW and WORDWISE. A dictionary disc is still supplied including 6,000 words, but a data compression technique is used to ensure that well in excess of 17,000 words may be stored on a 100K disc. Ingenious hashing and virtual file access routines have also considerably speeded up the time taken to check text. This sophisticated program is fully 6502 Second Processor compatible and uses the extra memory to further improve word retrieval time.



HELP ROM

What is the second sound parameter...?
How do I turn the cursor off?
Is it FX3 or 4 that...?
Do I need a comma or semi-colon in the PRINT statement?
What logical colour is red?



Give your micro a mainframe utility

Most large mainframe computers have a comprehensive on-screen HELP facility to aid programming, save time and help you out when you get stuck. BEEBUGSOFT's new HELP Rom will give your micro a similar facility.

Just plug it in, and every time you get stuck for a VDU call, a colour code, the parameters for a Basic command or whatever: the HELP Rom will provide an instant answer.

Rather than wade through a book, simply type, for example, *HLP VDU (or just *H VDU) to find out all you need to know about VDU commands - or if you know that it is VDU23 that you want - type *H VDU23.

The HELP Rom uses an ingenious compression technique enabling some 14,000 characters of text to be squashed into an 8K eprom, and provides help on a vast range of subjects, including the following major areas:

BASIC KEYWORDS
MEMORY ALLOCATION
SCREEN MODES
SOUND
COLOUR
TELETEXT
VDU
COMMANDS
FX CALLS

HELP will not
affect the normal
*HELP command

```
>*HLP VDU
VDU
Sends character to VDU queue
For specific help use *HLP VDU n

0 Nothing
1 Next char to printer only
2 Enable printer
3 Disable printer
4 Separate cursors
5 Join cursors
6 Enable VDU drivers
7 Bell
8 Cursor left
9 Cursor right
10 Cursor down
11 Cursor up
12 Clear text screen
13 Cursor to start of line
14 Paged mode on
15 Paged mode off
```

BEEBUG SOFT

SPELLCHECK II **£31**
SPELLCHECK I **£19**

HELP ROM **£25**

Available from your local dealer and selected branches of W.H. SMITH'S

Prices include VAT



ACCESS & BARCLAYCARD ORDERS & ENQUIRIES:
TEL ST. ALBANS (0727) 60263

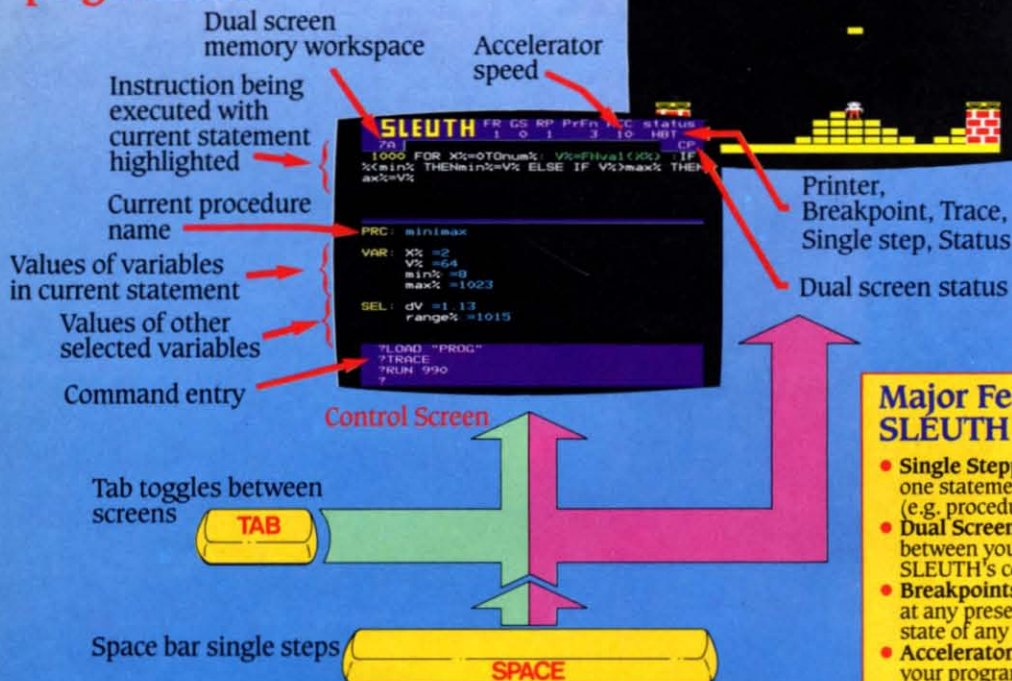
MAIL ORDER (POST FREE) TO: BEEBUGSOFT, Mailing Dept 16, P.O. Box 109, High Wycombe, Bucks

B.B.C. Micro

SLEUTH

Looking for bugs in your Basic?
Let Sleuth track them down.

Here at long last is the **ULTIMATE DEBUGGING TOOL** for the Basic programmer!



SLEUTH allows you to single step through your Basic program instruction by instruction, watching your screen display as it is built up. Simply press the Space Bar to execute the next instruction. Alternatively you may watch SLEUTH's control screen as you step through your program. (Press Tab to toggle between your own screen and the control screen.) This will show you the next instruction to be executed and allow you to list any part of the program. Also displayed will be the contents of all variables associated with the current instruction and the values of other specified variables.

At any time you may alter the values of

any variable or update memory. You can even change the line number of the next instruction to be executed or alter the logic within a program statement. Then simply press the Space Bar to watch the next instruction execute. Breakpoints may also be set up at any position in your program, these allow you to speed to the problem area and then see exactly what's happening. You may even set conditional breakpoints. e.g. Stop IF A%=20. Advanced trace and decelerator facilities are also included. The decelerator allows you to alter the speed at which your program executes, actually as if it is running.

SLEUTH is ideal for the novice and expert alike and will prove to be instantly invaluable, saving hours of debugging time. In addition, the single stepping facility makes it a powerful teaching aid.

Major Features of SLEUTH

- **Single Stepping through Basic** - one statement at a time or a block (e.g. procedure) at a time.
- **Dual Screen Operation** - flip between your program screen and SLEUTH's control screen.
- **Breakpoints** - pause your program at any preset line number, or on the state of any variable.
- **Accelerator** - adjust the speed of your program from full speed to freeze frame.
- **Full Feature Control Screen** - monitor and update vital aspects of your program as it runs.
- **Trace** - a sophisticated line trace facility operating when program runs.

Control Screen Features

- Control screen entered at the press of a key.
- Select edit or single-step mode.
- Adjust program run speed (1 - 100%).
- View the current program line with the current statement highlighted.
- List the whole or any part of your program.
- Alter the next line number to be executed.
- Read and adjust the value of variables in the current statement.
- Read and adjust the values of any other specified variables or array parameters.
- Insert or remove breakpoints and conditional breakpoints.
- Return to the program screen or continue to single-step or to run at any speed.

BEEBUG SOFT

Price **£29.00**

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MAIL ORDER (POST FREE) TO: BEEBUGSOFT,
Mailing Dept 16, P.O. Box 109, High Wycombe Bucks.



MEMORIES ALL BE MADE

Cumana are the market leaders for disk drives, all our drives are fully guaranteed for 12 months and are approved for electrical safety by the D.M.E.E. and are used extensively in G.L.C. and I.L.E.A. establishments.

Cumana was the first independent disk drive supplier and now is Europe's market leader. Our products have been proven in the schools, universities and homes throughout Europe.



**ALL 80 TRACK 5 1/4" DRIVES
ARE SWITCHABLE
TO 40 TRACK MODE**

CS RANGE

The Single 'CS' range of disk drives all have an independent power supply, with mains lead and moulded plug. They are supplied with formatting diskette, 2-drive connecting cable and comprehensive user manual. Upgrading your system is simple, with Cumana's design in enabling a second disk drive to be added without any modification to your BBC micro computer. All 80 track models are switchable to 40 track models.

CS100 40 Track single sided (100K)	£159.95
CS200D 40 Track double sided (200K)	£203.95
CS200 80 Track single sided (200K)	£192.95
CS400 80 Track double sided (400K)	£219.95

*CSX RANGE

A Single disk drive range that excludes the power connector. The 'CSX' range takes power from the BBC micro computer but, comes complete with all the extras of the CS range.

CSX100 40 Track single sided (100K)	£119.95
CSX200D 40 Track double sided (200K)	£165.95
CSX200 80 Track single sided (200K)	£159.95
CSX400 80 Track double sided (400K)	£189.95

CSE RANGE

The Cumana 'CSE' range of disk drives all come with an independent power supply and are supplied with all the accessories and benefits of their counterparts. They can be used to upgrade a system, with 2-drive connector cable - supplied with the 'CS' or 'CSX' range - enabling them to be added as a second drive by simply plugging in and switching on.

CS100E 40 Track single sided (100K)	£149.95
CS200ED 40 Track double sided (200K)	£192.95
CS200E 80 Track single sided (200K)	£180.95
CS400E 80 Track double sided (400K)	£208.95

DUAL SWITCHABLE RANGE

The ultimate in disk drives, the 'CD/S' range of disk drives all have independent power supplies, with mains lead and moulded plugs. All supplied with a formatting disk, drive connecting cable and comprehensive user manual; the design enables either drive to be switched independently between 40/80 track modes.

CD200 2 x 40 Track single sided (200K)	£284.95
CD400/S 2 x 80 Track single sided (400K)	£359.95
CD800/S 2 x 80 Track double sided (800K)	£414.95

**CUMANA'S
DUAL-DISK-DRIVE-
for the BBC microcomputer**

- High quality 5 1/4 inch Japanese dual disk drive
- Cabinet finished in hard wearing BBC beige
- Independent power supply
- 12 months warranty
- Fully assembled and tested



SHOULD LIKE THESE



Cumana's design includes an independent power supply* – complete with mains power supply lead and insulated plug. Each disk drive comes with a comprehensive user guide and formatting disk.

Send now for further details of the Cumana range, or see them at our distributors and at selected branches of W.H. Smith, Lasky's, Greens, Curry's and Spectrum UK.

Cumana's range of disk drives is also compatible with Spectrum, Dragon, Oric, Tandy models I, III and 4 and Video Genie:



CUMANA DISK DRIVE GUIDE



3 1/2 INCH DRIVES

Cumana 3 1/2" drives offer the same quality and reliability as their 5 1/4" counterparts with the added bonus of taking up less hardware space. Available in both single and dual formats they come complete with user guide and hard diskette.

CSX351 40 Track single sided (100K)	£139.95
CSX354 80 Track double sided (400K)	£199.95
CDX351 2 x 40 Track single sided (200K)	£256.95
CDX354 2 x 80 Double sided (800K)	£383.95

YOUR LOCAL DISTRIBUTOR

Available from the following
retail outlets:

**W. H. Smith, John Lewis
Partnership, Greens Leisure,
Laskys, Spectrum UK.**

Addons Ltd. (Southampton)
0703 34775/6

Audio & Computer Centre (Jersey)
0534-74000

Eltec (Bradford) 0274-722512

Gwent Computers (South Wales)
0633-841760

HCCS Associates (Gateshead)
0632-821924

Hugh Symons (Bournemouth)
0202-26535

J. S. Simnett Computers
(South London) 01-541 1495

Kingdom Design (Belfast)
0232-643720

Lightning (Harrow)
01-969 5255

Microage Distribution
(North London) 01-205 7688

Micro Express (Leicestershire)
0533 375757

Microworld (Edinburgh)
031-228 1111

National Micro Centre (Stockport)
061-429 8080

North Amber P.L.C. (Surrey)
01-391 2066

Thompson Cook (Birmingham)
021-328 3895

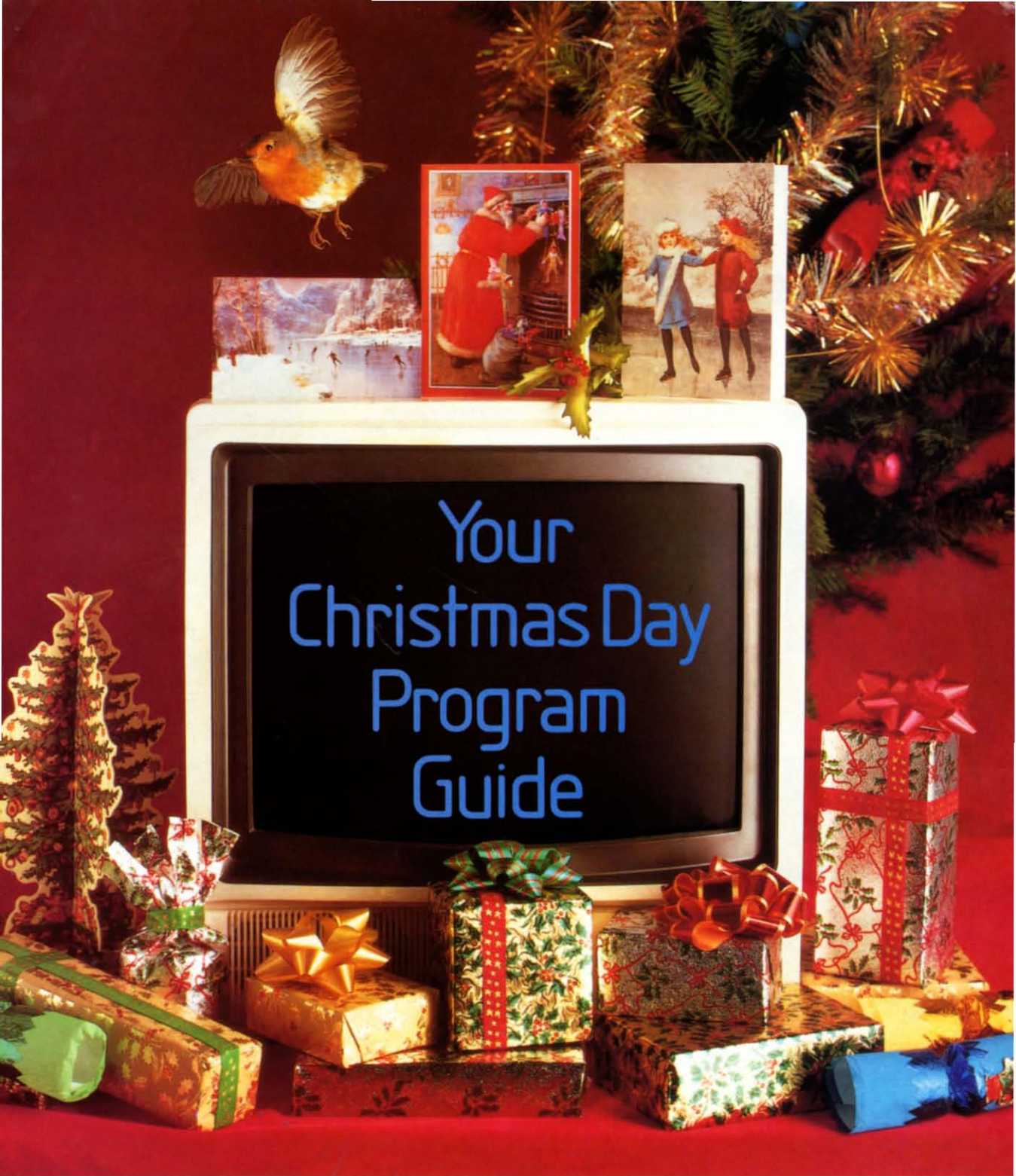
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Acornsoft announce tidings of great joy for both BBC Micro and Electron owners: eight brand new programs for Christmas.

Each one makes an ideal stocking filler.

They're all available at your local Acornsoft stockist. For the address or to order by credit card simply ring 0933 79300.

Or you can send off for our catalogue by writing to Acornsoft, c/o Vector Marketing, London Road, Wellingborough, Northants NN8 2RL.

Alternatively, however, you could always take a chance and drop a line to Father Christmas.

ACORNSOFT
Software for the BBC Micro and Electron.

9.00 Firebug

A fast moving arcade-type game in which you are a fireman, trying to rescue some oil drums and take them to the safety of a water tank. Your opponent is the firebug who runs around lighting fires which move slowly towards the drums and fire extinguishers, destroying them if contact is made.

10.00 Maze

A gripping graphics game where you enter a top secret installation with the aim of stealing secrets from a rival company. The security system, however, has many levels each consisting of a maze of corridors patrolled by armed robot guards. Complete with full colour 3-D graphics, sound effects and a high score table.

12.00 Elite

A superb 3-dimensional graphics game that's light years ahead of any other. You are a space trader who roams the universe, making your living from buying and selling cargo in your Cobra space craft. On your travels, you will encounter aggressors who are eager to put an end to your dealings. Be warned, only the fittest will survive.

1.00 Crazy Tracer

A crazy adventure in which you guide a paint roller round the edge of a maze of rectangles, while avoiding the monsters which are trying to stop you by crushing the roller. Beware – as the game progresses, so the number of monsters chasing you will increase.

3.00 Go

'Go' is a board game for two players which originated in China 3000 years ago and is now more popular than Chess in the Far East. It requires strategic insight, intuition and a strong, calculating mind. If you wish, you can also challenge the computer at differing degrees of difficulty. A velly good game indeed.

4.00 Watch Your Weight

At last, a weight-loss program designed especially for you. With it, your computer becomes an expert wholly conversant with and sympathetic to your needs, and will help you choose an appropriate and individual weight-loss plan. The program also includes a calorie counter and a series of apposite menu suggestions to help stimulate your imagination when you just can't think what to eat.

5.00 The Complete Cocktail Maker

With everything from a Black Russian to a Betsy Ross, this program contains data sufficient to concoct a staggering 320 different cocktails.

6.00 Paul Daniels' Magic Show

Stun and amaze your friends with your astounding feats of magic. This program contains ten tricks to be performed by or with your BBC Micro/Electron. Hurry though – it's bound to disappear fast.

Ingenious...

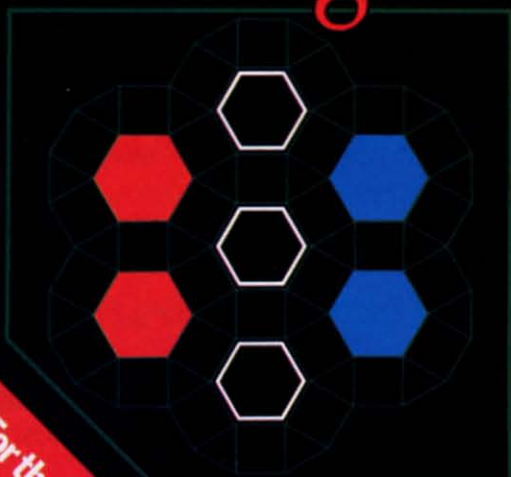
Leisure Genius presents **COMPUTER SCRABBLE**



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'more fun from
your micro'

Leisure Genius presents **COMPUTER Kensington**



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Computer games for people who hate computer games.

Give your joystick a rest,
and your brain a chance with these
family favourites.

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Sales soar by 27%

SALES of *The Micro User* soared by 27 per cent during the first six months of 1984, making it the third largest selling computer magazine in the UK.

The latest Audit Bureau of Circulation figures reveal that the average sales of *The Micro User* from January to June were 68,328 compared with 53,626 for the second half of 1983.

"We are delighted with the results in what has become a most highly competitive market-place", says Derek Meakin, joint managing director of Database.

"For not only have we maintained our position as the leading independent magazine for BBC Micro users, but we have also moved up to number three in the best selling computer magazine league table".

BBC Micro cracks US defence computer

A LEADING British "electronic burglar" cracked a key American defence system computer in a spectacular demonstration to open the recent Electron and BBC Micro User Show at Alexandra Palace.

Under the critical eye of top London journalists and a large crowd of show visitors, he took just three minutes to achieve the dramatic breakthrough.

Armed with only a BBC Micro and a modem – the device which enables computers to speak to one another over standard telephone lines – his successful attempt was delayed by one and a half hours.

But this was nothing to do with his expertise, only the fact that an ordinary British Telecom telephone

malfunctioned.

The 21 year old at the centre of the demonstration is a hacker – one of a new breed of computer whiz kids who have developed the ability to electronically break into sophisticated computer systems.

During his attempt, the hacker wore a hood. This was because of current work he is undertaking on the security scene, being called in by companies to help plug gaps in their systems.

The super show

THE bigger-than-ever Electron and BBC Micro User show from December 6 to 9 is set to smash all records.

Advance ticket sales have never been heavier – and 150 stands are booked in the 20,000 square feet of London's New Horticultural Hall.

A host of hardware and

software firms will be jostling for attention and the show will feature many specialist stands to give you the most up to date information about your BBC Micro.

There'll be a mind-boggling range of software, books, add-ons, robots, gadgets – and much more.

To enter the American computer, he first broke into a London computer, then leapfrogged to a computer in Daresbury from where he jumped across the Atlantic to an installation in Vancouver before making his final approach to Washington.

Not that anyone is going to benefit from the hacker getting into the defence computer – apart from the American government that is.

For a report is now to be sent to the US

authorities revealing how it was achieved so enabling them to tighten up their security.

"We decided to hold this demonstration as a timely warning to those who choose to keep highly sensitive data on computer systems", says Derek Meakin, joint managing director of Database Publications.

"After all, to get into the American defence system as easily as he did has frightening implications for society".

Cooking up a scare...

ACORN dealers across the country have been besieged by BBC Micro users fearful that their machines were about to explode.

It's all due to a tongue-in-cheek comment from technical editor Mike Cook in the October issue of *The Micro user*.

Answering an "error message" query on his Problem Page, he jokingly replied:

"Take your computer immediately to the dealer as this error message indicates it is about to explode".

Unfortunately some readers took him seriously and hastily headed back to their respective dealers believing their BBC Micros were potential bombs.

In turn anxious dealers

contacted the "bomb disposal squad", better known as Acorn headquarters.

When the case of the "exploding" Beebs reached Mike Cook he expressed total amazement at what had happened.

Victim

"Now who for one moment would have thought my remark would have been taken seriously?" he asked.

In fact, Mike Cook himself believed he was the victim of a "wind-up" when he received the original letter to answer.

"To be quite honest, I had never heard of an error message of this type before and my first reaction was that someone was pulling my leg",

he confided.

"But to make sure, I asked everyone else I knew about this and they all came to the same conclusion – it was a joke.

"However – just to make absolutely certain – I even consulted the experts at the Acorn Customer Services Department and even they had never heard of anything like it.

"So having exhausted every possible avenue, I decided it was definitely a leg pull.

"From here on in if we decide to describe sales of the BBC Micro as 'going like a bomb', we'll have to point out that we don't want to be taken literally". PS. Apologies to Acorn for clogging up their customer queries lines with bomb disposal calls.

Our gift to you

AS a "thank you" to readers who buy the monthly tape or disc of listings from *The Micro User*, we've got a surprise extra this month.

Included with this month's programs is a Christmas gift of a top-flight machine code game, Omega Probe, which has a retail price of £6.95.

When it was released in the spring it was hailed as breaking new ground in games for the BBC Micro.

One reviewer wrote: "This is a truly original, fast-moving and action-packed game that rivals even the best of arcade game classics.

"The many hazards encountered by Omega Probe are cleverly displayed by the use of three separate layers of objects, all moving simultaneously.

"This not only produces one of the fastest machine code games I have seen, but gives it an almost 3D effect".

The price of our tape and disc has not been increased – so this is quite a bargain.

You can send for it using the order form on Page 237.

Space Shuttle trip for micro whiz kids

THREE secondary school students will spend five days in America next year and witness a Space Shuttle launch - their prize for being this country's brightest computer whiz kids.

Queen's Award winner Microvitec is offering the trip as its way of saying "thank you" for the success of its Cub colour display monitors which are in use at more than 90 per cent of British schools.

The Cub Computer Challenge involves teams of three contestants aged 16 and under and is open to all the country's 10,500 secondary schools.

The competition has been organised around

the academic year so that it can be run during term time and the American trip taken during the summer break.

Preliminary rounds will be conducted by post with entrants having to use their school computer to solve a problem.

When the number of teams have been whittled down to 64 they will compete against one another on a knock-out basis.

Televised

From the quarter final stage onwards the remaining teams will have to solve a series of problems involving specially written programs and databases.

Microvitec is hoping the final stages of the contest will be televised. The firm is currently negotiating about broadcasting the last three rounds next spring.

The winning team members and their competition support teacher will be flown to Florida in August.

Microvitec managing director Tony Martinez says he hopes the contest will lead to a challenge, possibly in 1986, between British and US schools.

"We shall see how the competition develops over the coming months and, if successful, efforts will be made to open discussions to meet this objective", he said.



Bouquet for Garland

SOFTWARE house Garland Computing which specialises in educational programs for the BBC Micro has been named brightest new business talent in the South West.

The competition was organised by BBC Television and English Estates, the government agency that provides premises for small businesses.

Garland has recently signed agreements for distribution of its pro-



grams in Australia and New Zealand and is negotiating translation rights in several European countries where the BBC Micro is sold.

In existence for two years, the firm publishes more than 50 programs covering such subjects as biology, chemistry, physics, maths geography and music.

Link with the future

A NEW sister publication to *The Micro User* has been launched to monitor a revolutionary chain of events which will eventually transform the lives of all BBC Micro users.

TeleLink is the first British magazine to comprehensively cover the field of telecommunications since the arrival of the modem.

"We believe the modem marks the biggest breakthrough since the arrival of the micro itself", says managing editor Derek Meakin.

"It is going to change the shape of all our lives in the years to come."

"And *TeleLink* will be right there reporting on



every fascinating step along the way".

In its launch issue the new magazine takes an in-depth look at hackers - the electronic burglars who can unlock the secrets of almost any computer, armed only

with a micro, a modem and a telephone.

And in an exclusive interview with Britain's No. 1 hacker, *TeleLink* reveals that big business is calling in the electronic whiz kids to help plug the gaps in corporate computer security systems.

Among a vast range of topics covered, the first edition examines the current battle of the bulletin boards and identifies the top stores switching to teleshopping.

"We intend to open up the exciting new world of videotex and telecomputing, public and private viewdata, electronic mail, bulletin boards, teleshopping and telesoftware", says Derek Meakin.

Priced at £1, *TeleLink* is now available from all leading newsagents.

UPGRADE OFFERED TO SCHOOLS

SCHOOLS wishing to upgrade from cassette to disc are getting a helping hand from Garland Computing.

The firm, which publishes more than 50 educational programs for the BBC Micro and Electron, is offering what it believes is a unique service.

Schools can return Garland cassettes with a formatted disc, postage and packing and receive the disc version free of charge within a week.

Obstacle

Garland director Colin Munn explained: "Most schools that bought BBC Micros started off with

cassette recorders.

"Disc drives are now more available but some schools find the cost of new software an obstacle. Those who try to copy the software on their own equipment often find it doesn't run properly."

"Our disc upgrade service means they get perfect software for the

cost of a disc and postage.

"So far we've serviced about 100 schools this way and usually been able to return the disc within a couple of days of receipt."

"If we get a flood of work from schools it might start to take longer - but I can promise they will all be dealt with satisfactorily."

Acorn into video

ACORN has brought out an interactive video system for computer-aided training that combines the BBC Micro with the Laservision videodisc player.

NO FUTURE IN IT FOR ACORN?

IT appears that Acorn Computers has failed in its attempt to get the BBC Micro officially recognised as a direct competitor to Future Computers' business machine.

The two firms fell out (*The Micro User*, October) over Future's advertisements claiming it has "the only micros designed with a built-in networking facility at no extra cost".

Acorn complained to the Advertising Standards Authority that the adverts were "misleading and unfair to the public and unfair to the BBC Micro".

The ASA's Code of Advertising Practice Committee agreed to take up the matter and letters

have now been sent to the two parties by ASA outlining the CAP committee's preliminary opinions.

The Micro User understands the letter slaps Future's wrists for publishing advertising copy that could be misleading and unfair to Acorn.

But it also appears to shoot down Acorn's claims that the BBC

Micro is comparable to Future's business machine.

The ASA accepts Futures principal point that Acorn's system does not have built-in networking. *The Micro User* was told.

However the dispute is not yet over. The CAP committee's draft report is due at any time, following which the two

firms have 10 days in which to present further arguments before CAP gives its final verdict.

An Acorn spokesman refused to comment on ASA's preliminary letter or say whether Acorn will contest CAP's opinion regarding built-in networking. But Future's advertising manager, Keith Bevertson, said he felt his firm's advertise-

ments had been vindicated by the letter.

But he took issue with the ASA's view that Future had been unfair to Acorn in the text of the advertisements.

"The BBC Micro is not in the same class as our machine as a business tool, and it is silly to suggest we are being unfair by saying so", he said.

School program will be going on tour

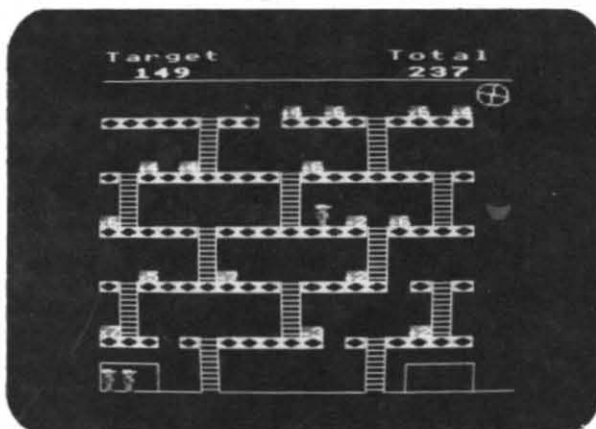
THESE members of the computer group at Chipping Norton School, Gloucestershire, have used their BBC Micro to design a program and game that will be touring the UK and Europe as part of a mobile exhibition for the next 12 months.

The program promotes the products of compressed air equipment manufacturer IMI Fluidair with animated graphics showing how the compressors work.

In the game players have to lead a compressor through a maze while protecting it from a gremlin.

The school, under headmaster Mr J.G. Howells, has long established links with industry and has actively encouraged the rapid growth of computing in its curriculum.

The boys, aged 13 to 17, devised the program and game in less than a month to ensure it could make its debut at a national engineering show.



THE educational software producer Applied Systems Knowledge has developed a new mental arithmetic program for the BBC Micro called Number Painter.

Aimed at children aged 5-14, it is available on

cassette for £9.95 or disc for £11.50.

The fast moving arcade style game is designed to improve mental arithmetic.

Players are challenged to make a given number within a self-imposed time

limit using only the numbers shown on the screen.

The numbers are collected by Mr Painter who must be manoeuvred up and down ladders at four different speeds to cope with various dexterity levels.

Compact graphics

A COMPACT graphics system for the BBC Micro is available from PMS.

It is designed to transform coordinates from a sonic digitiser into graphic displays thus enabling direct calculation of lines, areas, angles, slopes, save data, scale and plot.

The system consists of a BBC Micro, dual disc drive and GP7 sonic digitiser. The digitiser can be bought separately.

A Multidig program is designed to manipulate the XY coordinates. The 18 x 24in digitiser has a built in menu including line mode, stream mode, origin, metric and cancel.

Phi Mag printer

A NEW low-cost thermal printer for the BBC Micro and Electron has just been launched by Phi Mag Systems, the people responsible for the Phloopy data storage tape (*Micro User*, May 1984).

Called the Phiprint, the 40-column printer has a nine-element dot head which gives true descenders and underlines.

The character set gives 96 characters in three pitches, plus the ability to condense or extend the typeface.

CHRISTMAS CRACKER. A MEGABYTE DISC SYSTEM FOR £299^{·95} (INC. VAT) ●

Elite 'poised for 100,000 Xmas'

ACORN SOFTWARE predicts its new cult spaceflight simulation game for the BBC Micro - Elite - will have sold more than 100,000 copies by the New Year.

This would make it the firm's most successful program ever, with sales more than double those of any previous Acornsoft

game.

The company bases its claim on the fact that Elite sold 13,000 copies in the first two weeks following its launch to become the country's fifth best selling game at the beginning of October.

Acornsoft managing director David Johnson-Davies said: "The

tremendous success of Elite proves that, contrary to predictions from other home software companies, the games market is very much alive.

"It also proves the consumer is more sophisticated now, and is prepared to pay the higher price of really good, innovative games".

Logo for BBC Micro

LOGO Software has published Logo for the BBC Micro.

A full version including list processing and floating point arithmetic is available from E.J. Arnold and Son's school computer service priced £59.

LSI Logo is the product of two years' development by Catsoft, the team responsible for the BBC Logo feasibility study for the Department of Trade and Industry in 1982.

It is written in assembler and fitted onto a single 16k eprom chip, taking up only one socket on the BBC Micro.



TANDBERG has launched a device that adds a random access voice to training and educational programs run on the BBC Micro.

The TCCR can be used on its own as a conventional tape recorder, or in conjunction with any micro with an RS232 interface, when it becomes a computer controlled cassette recorder.

Its built in micro-

processor performs control operations - scanning the keyboard, high speed wind and rewind, play or record - and computes the linear position of the tape and displays its position on a seven segment LED display.

Tandberg also offers two authoring packages commissioned for educational and training use with the TCCR and BBC Micro.



BRITISH GAS GIVES BBCs

A DOZEN BBC Micros are the top prizes in an energy conservation quiz being run by British Gas.

Details of the contest, open to children under 17, are on the back of the sixth edition of the "Wasteful" comic.

This has had nationwide distribution with Radio Times and a number of children's publications including Eagle

and Girl.

Spare copies are available free from gas showrooms.

First prize in each of the 12 gas regions is a BBC Micro, second prizes are pocket calculators - and there are thousands of runner-up prizes of a puzzle game called Archimedes.

Closing date is December 14.

Micro comes to the psychologists' aid

PSYCHOLOGISTS will soon have a new weapon in their armoury to help the mentally handicapped and manically depressed - the BBC Micro.

An Open University graduate, Richard Beck, is currently updating a key research program for use on the machine.

The original program was written several years ago for the Nova 2000, but as this computer is no longer commercially available, psychologists have been at a loss to make use of this vital

information.

Beck, a chemist with Thorn EMI, decided to remedy the situation as part of his research to obtain his Master's Degree.

What he found he needed was an IEEE-488 interface to link a network of BBCs - each with their own dedicated programs running different types of experiment - to other instruments.

So he successfully sought the support of Cambridge Systems Technology, who develop

and market the Procyon interface.

The end result is that the rewritten behavioural science programs for the BBC Micro will soon be on their way to psychologists.

Using the programs to regulate and monitor experiments in the behaviour of animals, the responses are logged to measure stress.

This eventually leads to helping human patients to cope with difficult developments in their everyday lives.

Network for schools

AMCOM Software, authors of E-Net, is to write a low price network system for schools.

This will allow as few as two BBC Micros to be economically networked without the loss of the files server machine.

The system is intended for schools which will never need a full hard disc system - or which want to

take networking step by step without creating redundant equipment on the way.

It was designed by Oakleaf Computers, which is also to distribute Amcom products in southern England.

The new network, due out before Christmas, will use the existing E-Net client station software.

ADVICE ON VIDEO

SMALL firms thinking about computerising their paperwork can get advice on how to do it from a new video produced by Masterclass in conjunction with Acorn Com-

puters.

The £19.95 cassette describes how the BBC Z80 system operates and explains what peripherals are required for various applications.

Program trains users

AN integrated business software package – soon to be available for the BBC Micro – is claimed to be unique by makers Accounting Software.

Cash Trader requires the user to go through a two hour sequence of learning and training exercises to understand the program's capabilities before access to the main program is allowed.

The program enables businessmen to input a wide range of unrelated transactions through a single screen. These can include credit sales and purchases to business expenses and cash movements.

The system operates in real time and continuously displays profit and loss and balance sheet figures resulting from each transaction in a window above the input area.

Eighteen other reports can be displayed in this report window.



Robots get their own shop

WHAT is claimed to be Britain's first retail shop for robotics fans has just opened in London.

Robotics Workshop is an offshoot of Entryphone, makers of intercoms for apartment blocks.

The idea is to provide a meeting place for robotics buffs, plus a place they can buy equipment for their creations.

Says managing director Gordon Ashbee: "There's nowhere else you can buy robot components in small quantities – and nowhere to see robots, unless you go to a manufacturer".

Six of the demonstrations are set up on BBC Micros, linked by Econet – an ideal educational set-up, thinks Ashbee.

At the moment, he has half a dozen robots on show, plus some robot kits from Prism Technology. He expects the number to grow, as the word gets round.

According to Ashbee, robotics is still a cottage industry with isolated inventors turning out small numbers of robots.

PLOTTER PRINTS, TOO

PENMAN Products has launched a three colour graphics plotter which doubles as a printer capable of lettering down to 1mm high, a desk top turtle, a precision robot with collision detection ability, and a mouse.

Priced £217, the unit consists of two parts – a control box containing the electronics and a 5in

square robot which moves around on the paper to draw graphics.

Design of the Penman plotter enables it to draw straight lines in any direction and circles on a variety of paper sizes.

Standard Basic and Logo drivers will be provided for a number of computers including the BBC Micro.

Eye on the stars

WEIGHT watchers, stargazers and budding masterminds are among the people Mirrorsoft is catering for with five new programs in the Home Discovery range.

BBC Micro users are being offered Astronomy, developed in conjunction with the London Planetarium; Personality Profile, adapted from the best selling book by psychologist Professor Hans Eysenck; Weight Control, introduced by Professor Justin Joffe; Psychic Ability, a test developed by Hans Eysenck and Carl Serjent; and Mastermind Quiz and Editor, based on the BBC TV series.

All cost £9.95.



School produces software

THE Summerfield School for Deaf Children is to market its own educational software – the proceeds of which will buy the school more BBC Micros.

Principal Fred Eulenkamp, who has just published a report on micros in education, is

critical of some educational software.

"Many educational programs are written by authors who don't understand children's needs", he said.

Some programs seek to teach topics which can be put over more easily on the blackboard, he added.

The new venture – Summerfield Software – is initially offering five educational programs for the BBC Micro at prices in the £6 to £9 range.

Their use is not limited to deaf children. "They are suitable for primary or even secondary schools", says Eulenkamp.

PLAY THE GAME AND SAVE FOR A MICRO

YOUNGSTERS saving up to buy a BBC Micro will find it a cheaper proposition if they have an account at the Luton branch of the Leeds Permanent Building Society.

If they successfully play one of three special building society games on micros installed at the branch youngsters up to 18 receive an automatic £1 voucher printout with which to open a savings account.

And distributors Broadway Electronics

will knock £10 off the price of a BBC Micro and give free software if the purchase is made with a Leeds cheque.

Broadway is one of four Acorn dealers taking part in the pilot scheme in East Anglia. The Leeds hopes to extend the idea to the rest of the country

Price of evil

PALACE Software has issued a BBC Micro version of its first title. The Evil Dead. Price £7.99.

SYSTEMS

SANYO 555 Q

IBM compatible, 128K RAM,
2 x 360K Drives. Price includes: Wordstar,
Mailmerge, Info-Star and Calc-Star.



(Monitor available at extra cost) £999

BBC-B £379

Includes free tape recorder. Full range of
Software and Disk Drives available.



ELECTRON £199

Includes free software tape



PRINTERS

Brother Printer HR 15 £399
Juki Daisywheel 6100 £389

EPSON RX80 FT £269
EPSON FX80 £379

Including lead for BBC.



DISKETTES

Control Data, in packs of 10
SS 40tk.....£16.00
DS 40tk.....£19.98
DS 80tk.....£26.00

Including VAT, p&p.

Christmas means discounts at Microware

DISK DRIVES

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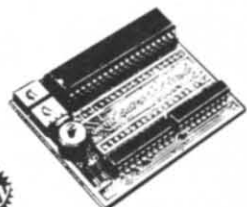
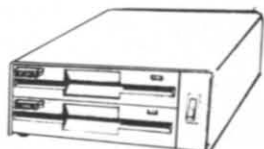
plus new 3 1/2" range
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Normal res. £199
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AP = + £25



Call for our full price list.

ACCESSORIES

BBC Stands.....£15.00
Dust covers.....£5.60
(for BBC,
Drives and
Printers)



Disk storage boxes.....
£15.00 (takes 35)
Disk storage boxes.....
£20.00 (takes 80)
Prices include VAT, p&p.

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Product Price Qty Total

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I enclose my order for the above products.

TOTAL SUM ENCLOSED (Cheque or credit card no.) £
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NOW OPEN

Name _____

Address _____

Signed _____

NOW BBC MICRO MOVES INTO HIGH FINANCE

THE BBC Micro is being used by Scrimgeour, Kemp-Gee – a London research brokerage firm – in what is claimed to be one of the most sophisticated financial and market data systems in the world.

Graduate gets Xchange

THE Graduate – the Torch Computers upgrade that makes the BBC Micro IBM-compatible – now comes complete with Psion's Xchange business software.

The Xchange suite comprises four packages: word processing (Quill), database management (Archive), spreadsheet (Abacus) and business graphics (Easel).

Up to eight tasks can reside in the computer at the same time. The user can switch from one task to another with simple keyboard commands, says Psion.

Psion is the London-based software house that launched the Organiser pocket computer earlier this year. It also wrote the applications software for the Sinclair QL.

Upgrade

Torch chairman Bob Gilkes said: "The Graduate is a major product for Torch and with the Xchange integrated business application software bundle it will provide a complete and extremely powerful upgrade path for BBC users".

He said clients who had already ordered the Graduate can take the bundled software and should contact their dealer for details.

The Graduate comes in four models – single disc, 128k user memory, single disc, 256k, twin disc, 128k and twin disc, 256k.



Data processing manager Mike Oliver demonstrates the Dogfox system

The system, Dogfox, cuts out the need for several monitors to display the stock market information and facilitates direct access to data without the menu process.

Information can be presented using graphs, split screens plus different shades and colours. Data is automatically updated from several international sources.

The system takes advantage of the BBC

Micro's special features, in particular its scope for personalisation and expansion.

It communicates with Topic, the Stock Exchange viewdata system for price information and SKG's databanks to display data from several sources on one screen.

Further development

of the system came from using spare sideways ROM sockets in the BBC Micro with an eeprom chip to enable the micro to 'talk' at very high speeds with SKG's database.

Graphics were enhanced with a second eeprom to produce infinite shades of colour.

"The BBC Micro has been ingeniously designed and meets our needs very

well, yet its low cost has enabled us to supply complete systems to several of our major institutional clients", said DP manager Mike Oliver.

"Although originally intended for internal use only, we now have over 100 systems installed in client offices all over the UK, linked by modem to our own databanks".

PROGRAM FOR POOLS PUNTERS

FANCY a nice win on the pools? The 1984-5 football season could prove a lucky one for some BBC Micro users.

Reason is that Hartland Software's football pools program is now available for the machine.

The program utilises current goalscoring and defensive records of teams to calculate the probability of matches ending as homes, aways, draws or score draws.

It then selects 16 matches from each

category and places them in order of probability.

Another part of the program indicates the probable result for each individual match on the coupon.

Probability

And it also gives the percentage probability match by match and

reveals which games are the best fixed odds bets.

The program's inventor, Lance Hartland, claims a typical week's results show a 70 per cent success rate for home win forecasts, 45 per cent for aways and 30 per cent for draws – "a lot better than chance", he says.

At present the £8.95

program is only available by mail order but Hartland hopes to place it in the shops soon.

His income from program sales was augmented last spring by a number of minor personal wins on Littlewoods totalling more than £400.

A tip from the inventor: Always choose one or two selections with a pin. "No matter how good my program is, winning the pools still comes down to luck", explained Mr Hartland.

For chess buffs

A CHESS analysis package has been released for the BBC Micro by Compuchess.

Chess Analysis System can be used to build up and update a personal chess opening system, to record and analyse games and to analyse positions.

It costs £9.95 on cassette and £11.95 on disc.

Micro takes over the microscope

SOUTHAMPTON computer consultant Dr Lionel Wardle has come up with a package he claims will revolutionise laboratory work where technicians peer into microscopes and count things – and the BBC Micro is cast in a major role.

He says there are two main drawbacks to the present way of doing the work. One is the sheer slowness of counting the objects under the microscope.

The other is the bore-

dom factor. Humans are simply not suited to repetitive counting. And so after about 30 minutes, their concentration wanders.

Under the new system, a video camera does all the looking. It scrutinises the microscope slide and digitises what it sees.

Then the BBC Micro compares the result with a digitised model of what the count should be.

This procedure takes a few seconds, compared with minutes – or even hours – when a technician does the job.

The boredom factor is cut out completely.

Wardle claims his method is not only more reliable than the old way, but also saves enough time to pay back the cost of the package "in a matter of days".

The price is £175.

LEADERS OF THE PACK

CUB 452 is the most popular 14" standard resolution range of colour monitors available.

Why? Well, the 452(H) x 585(V) tube resolution eliminates disappointing colour reception and poor character definition associated with domestic TV's and other colour monitors. Optimum compatibility means owners of BBC, ORIC 1, ATMOS, ACORN ELECTRON, RML 480Z and many others can plug in and they're in business. Amazingly, CUB 452 is the only colour monitor to interface directly with the SINCLAIR SPECTRUM.

Then there's CUB RGB/PAL, the one that really sets us apart from the others. This continues CUB's revolutionary

advance in high performance colour displays by producing brilliant images when used with a micro computer. Yet RGB/PAL also produces the highest quality pictures from LASER DISCS, VCR's and VIDEO CAMERAS. Add to this an audio facility, plus display of all TV broadcast channels when used with a VCR and the result is a versatile colour monitor which sounds as good as it looks. RGB/PAL is compatible with BBC(A&B), COMMODORE 64, APPLE series, DRAGON 32/64, TANDY, ORIC 1, RML 380Z & 480Z, SHARP, THE MSX RANGE and many others.

So now the leaders of the colour monitor pack give you a choice: CUB 452 or the revolutionary RGB/PAL – either way, you're on a winner.

– THE CUB STANDARD RESOLUTION COLOUR MONITOR



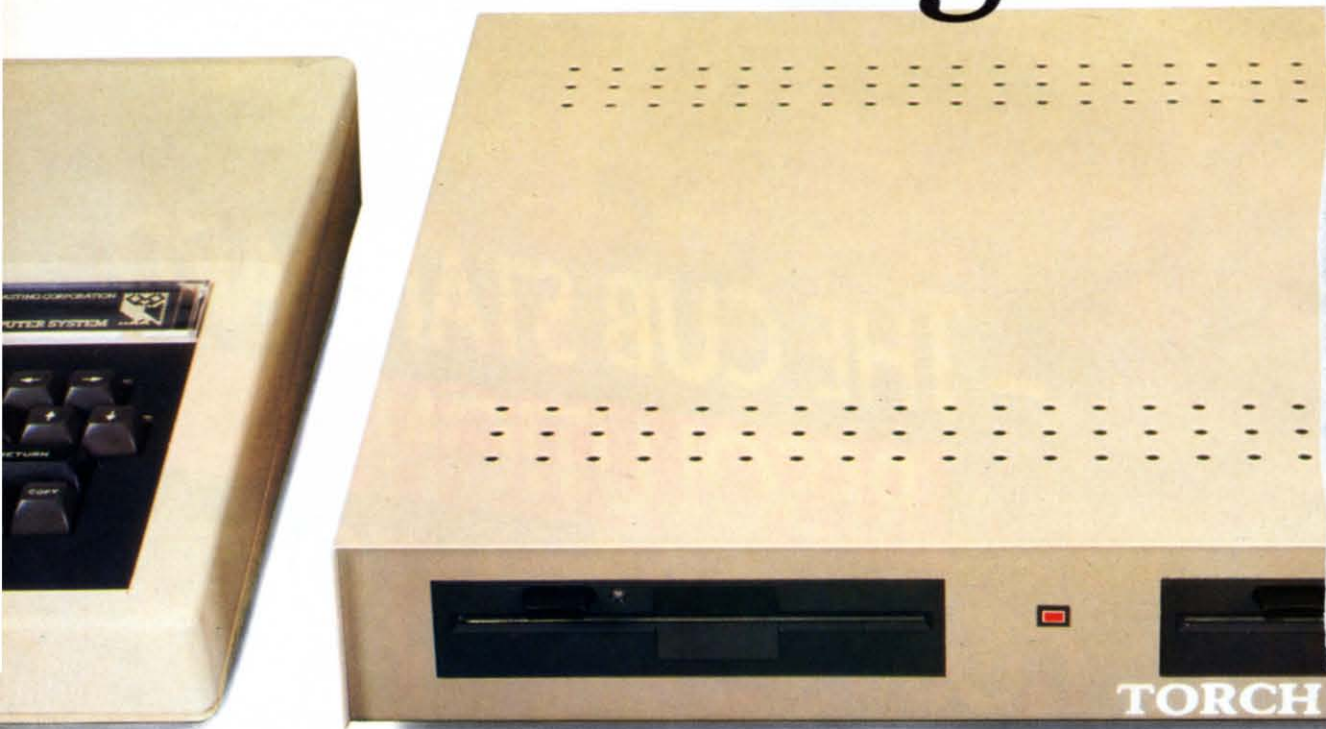
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Available from High Street Computer Retailers and branches of W. H. Smith, Harrods, John Lewis Partnership, John Menzies with selected models available from larger branches of Boots.

The best thing next



The BBC Model B Microcomputer is widely recognised as an impressive first computer for the home or the school, but its capabilities are restricted by its lack of data storage and the limitations of Basic for serious programming. For the user who needs more from this computer the Torch Z80 Disc Pack is a gateway to the world of advanced computing.

Model B's fitted with disc interface can be upgraded to full business machines by the Torch Z80 Disc Pack thereby offering the use of more powerful and flexible languages such as Fortran, Pascal, BCPL and Cobol while twin 400K disc drives provide a massive storehouse for information and rapid data transfer from disc to processor.

Torch Z80 Disc Pack The Torch Z80 Disc Pack is the



proven upgrade for the BBC Model B microcomputer. It provides 800K of disc storage plus a Z80 second processor with 64K RAM running TORCH's own CP/M® compatible operating system based in ROM.

This advanced design means that almost all of the 64K RAM provided by the Z80 board is available for programming use – an advantage no other BBC micro upgrade can offer.

If your BBC micro has the Econet® option, there is a further benefit the Torch Z80 Disc Pack can offer. TORCHNET can link together up to 254 upgraded Model B's on a local area network, so for enthusiasts, clubs, schools and businesses it is a simple and low-cost way to achieve networking facilities.

The discs can be used for storage under the Acorn DFS system or for CP/M® programs and data.

A comprehensive software package is provided which includes word and data processing and a spreadsheet program, along with utility programs and manuals.

The Torch Z80 Disc Pack is recommended by the CCTA for government use.

At £699 the Torch Z80 Disc Pack is exceptionally good value.

Torch Z80 Extension Processor (ZEP100)

When fitted to a BBC system which already has compatible high quality twin 400K disc drives, the ZEP100 provides a complete business or scientific computer.

Alternatively, a ZEP100 may be fitted to a BBC system to enable it to be used as a Torchnet station.

The ZEP100, priced at £299, comes complete with full software support. There are already over 10,000 users of Torch computer systems.

Our customers include hospitals, universities, private businesses, the Government and schools.

If you are ready to take a step into the world of serious computing contact your local dealer listed on the facing page.

Part 20 of MIKE BIBBY's introduction to programming

Now that you know it all (well almost)

YOU may not have realised it yet, but you've covered all the fundamentals of computing. All right, there are still several new ideas, but mostly they're based on combinations and enhancements of things already covered.

Take this month for example. We're going to use the FOR...NEXT loops we're quite familiar with, but combined in an extremely powerful way.

Have a look at Program I:

```
10 REM PROGRAM I
20 MODE 6
40 FOR inner_loop% = 1 TO 5
50 PRINT inner_loop%
60 NEXT inner_loop%
```

Nothing too taxing here, but type it in anyway — and keep to the line numbering.

When you run it you won't be surprised to see the numbers one to five being printed out. They're the values that *inner_loop%* takes.

Notice, it's *inner_loop%*. No prizes for guessing that there's going to be an *outer_loop%*.

What we're going to do is to "wrap-up" one loop inside another.

Now the loop we're going to wrap up this way is that of Program I, lines 40 to 60, so let's make sure we know exactly what that loop does: *It outputs the numbers one to five.*

Next have a look at Program II:

```
10 REM PROGRAM II
20 MODE 6
30 FOR outer_loop% = 1 TO 3
40 PRINT "Do the "
50 PRINT "inner"
60 PRINT "loop"
70 NEXT outer_loop%
```

Again there is only one loop, which is performed three times as loop variable *outer_loop%* goes from one to three.

All the loop does is to print out:

*Do the
inner
loop*

(corresponding to lines 40 to 60) three times.

Again, nothing too difficult. However as you've guessed lines 40-60 are a

dummy. We're meant to insert there the inner loop mentioned.

Before we do let's get clear exactly what the outer loop does: *It performs whatever lines 40 to 60 tell it to do exactly three times.*

In this case lines 40 to 60 simply print out a message.

In Program III, however, we've inserted the loop of Program I (lines 40 to 60) inside the loop of Program II (lines 30 and 70).

```
10 REM PROGRAM III
20 MODE 6
30 FOR outer_loop% = 1 TO 3
40 FOR inner_loop% = 1 TO 5
50 PRINT inner_loop%
60 NEXT inner_loop%
70 NEXT outer_loop%
```

We know from previous experience that the outer loop performs lines 40 to 60 three times exactly.

We also know that lines 40 to 60 print out the numbers one to five.

So the outcome is that the loop of lines 40 to 60 is itself performed three times.

That is, the numbers 1 to 5 are printed out three times in succession.

I find it helpful to think of the inner loop as a "black box". I know it's going to print out the numbers 1 to 5, and I don't care how.

The point is this black box is inside a loop that's performed three times, so I

get the outcome of that black box three times.

Once you've convinced yourself that you can see how Program III works try the following alterations:

```
30 FOR outer_loop% = 1 TO 4
```

and then:

```
40 FOR inner_loop% = 1 TO 3
```

Try to predict the outcome in each case.

Loops like this, where one is inside another, are called *nested* loops. They always remind me of the Russian Katusha dolls, one nestling neatly inside the other.

Take a look at Program IV:

```
10 REM PROGRAM IV
20 MODE 6
30 outer% = 0
40 FOR inner% = 0 TO 4
50 PRINT TAB(outer%, inner%)
  "Hello"
60 NEXT inner%
```

No nested loops here as yet, though the *outer%* looks ominous. At the moment though it's set constantly to zero, while loop variable *inner%* goes from 0 to 4.

As you'll see the effect is for line 50 to print out "Hello" on five successive lines

From Page 35

of the screen at the left hand side.

If you re-run the program with line 30 changed to:

```
30 outer% = 6
```

you'll see that the five are now printed seven characters in from the side, though still on successive lines.

Try it with values for *outer%* of 12, 18 and 24. These values weren't chosen at random — have a look at Program V:

```
10 REM PROGRAM V
20 MODE 6
30 FOR outer% = 0 TO 24 STEP 6
40 FOR inner% = 0 TO 4
50 PRINT TAB(outer%, inner%)
  "Hello"
60 NEXT inner%
70 NEXT outer%
```

It's similar to Program IV. But this time, instead of *outer%* being fixed, it takes the values 0, 6, 12, 18 and 24 consecutively, since it is now the loop variable of the FOR...NEXT loop of lines 30 and 70.

Here we have a case of nested loops again.

Lines 40 to 60 form the inner loop, and we know from Program IV what they do: *They print out Hello five times on successive lines, indented on each line to the value of outer%.*

So our black box (lines 40 to 60) prints out Hello five times. However this box is itself in a loop that's done five times (0 TO 24 STEP 6). Thus we should expect to get five lines of Hello printed out five times.

However each time through the outer loop, *outer%* varies. So when we perform our black box the set of five Hellos are TABbed further across the screen, but on the same lines.

The trick when trying to decipher nested loops such as in Program V is to "ignore" the outer loop by making the loop variable's value constant at, say, its first value. This is what we did in Program IV.

That way you can concentrate on exactly what the inner loop is doing, not worrying what the outer loop is doing.

Once you've got that worked out you can then try it for the next value of the outer loop and so on.

After mentally running through two or three values of the outer loop in this way you can soon pick up the pattern of the combined effects of both loops.

It might also help you to see what's

going on in Program V if you change ever reference to *outer%* to *across%* and every *inner%* to *line%*.

Often meaningful variables such as these are a great help in untangling nested loops. I've been using *inner%* and *outer%* simply to emphasise the nested nature of what's going on.

Before we leave Program V, try changing line 30 to:

```
30 FOR outer% = 0 TO 6
```

Can you see what's happening? You'll appreciate my need for steps of 6!

Let's turn our attention to Program VI — it won't surprise you to see that it involves nested loops.

```
10 REM PROGRAM VI
20 MODE 6
30 FOR outer% = 0 TO 21
40 FOR inner% = 1 TO 5
50 PRINT CHR$(64 + outer% + inner%);
60 NEXT inner%
70 PRINT CHR$(13)
80 NEXT outer%
```

See if you can discover its workings before we discuss it.

Once more we concentrate on the inner loop first, and we'll consider *outer%* to have its initial value of 0.

In this case line 50 — the working part of the inner loop — will print out:

```
CHR$(64 + 0 + 1) = CHR$(65) = A
CHR$(64 + 0 + 2) = CHR$(66) = B
CHR$(64 + 0 + 3) = CHR$(67) = C
CHR$(64 + 0 + 4) = CHR$(68) = D
CHR$(64 + 0 + 5) = CHR$(69) = E
```

all on the same line.

Next time through the outer loop, *outer%* has the value 1, so our inner loop prints out:

```
CHR$(64 + 1 + 1) = CHR$(66) = B
CHR$(64 + 1 + 2) = CHR$(67) = C
CHR$(64 + 1 + 3) = CHR$(68) = D
CHR$(64 + 1 + 4) = CHR$(69) = E
CHR$(64 + 1 + 5) = CHR$(70) = F
```

all on the same line.

Next time *outer%* has the value 2, and the inner loop prints out CDEFG.

I think you can guess the pattern by now. If you haven't run the program yet, do so.

Notice, by the way, the line between the NEXT of the inner loop and the NEXT of the outer loop (line 70).

The effect of line 70 is simply to ensure that after the inner loop has printed out its five characters — all on the same line because of the semicolon

at the end of line 50 — a carriage return is performed (CHR\$(13)).

This ensures that the next time the inner loop is performed, output is on a new line. Leave out line 70 if you don't believe me.

The standard example people seem to choose for nested loops is a multiplication tables program.

Not wanting to be outdone, I present my version — Program VII. I leave it to you to work out what's happening, using the tactics we've already discussed.

```
10 REM PROGRAM VII
20 MODE 6
30 FOR table% = 1 TO 10
40 CLS
50 FOR mult% = 1 TO 10
60 PRINT mult% " X "; table%; " = ";
  mult% * table%
70 NEXT mult%
80 PRINT TAB(5,20) "Press any key
  for next table"
90 dummy$ = GET$
100 NEXT table%
```

If you're dying to write your own program with nested loops using them to print out 22 lines of six asterisks, it only requires slight modifications to Program VI.

Now take a look at Program VIII:

```
10 REM PROGRAM VIII
20 MODE 6
30 outer% = 1
40 FOR inner% = 1 TO outer%
50 PRINT "*";
60 NEXT inner%
```

As you can guess from the *outer%* of line 30 this program is eventually going to have an outer loop as well as an inner one.

Line 40 is new. Instead of having a fixed loop inside we go from 1 TO *outer%*. If you run the program you'll see that all we get is a solitary asterisk.

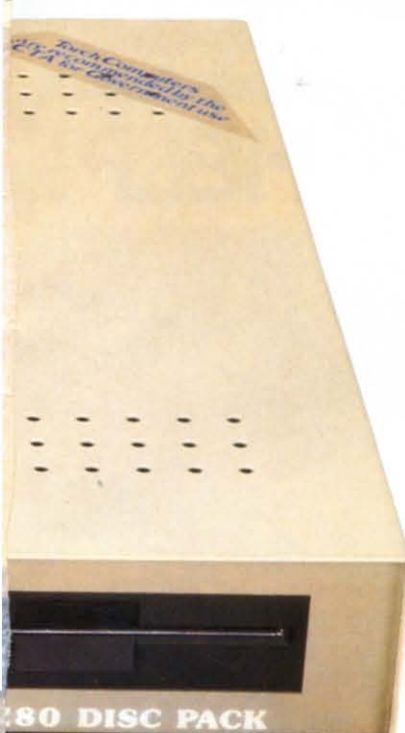
Now try it with:

```
30 outer% = 2
```

You'll get two asterisks! I think you

```
10 REM PROGRAM IX
20 MODE 6
30 FOR outer% = 1 TO 24
40 FOR inner% = 1 TO outer%
50 PRINT "*";
60 NEXT inner%
70 PRINT CHR$(13)
80 NEXT outer%
```


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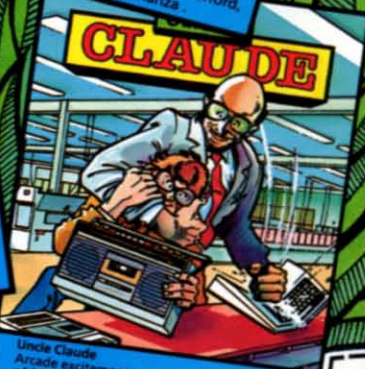
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can see that `outer%=3` will give you three asterisks, and so on...

Now let's consider Program IX.

Here we've encased the loop from the previous program in an outer loop in which `outer%` varies from 1 to 24.

Now we know that the inner loop prints out exactly `outer%` asterisks. So the first time through the outer loop our black box gives us one asterisk, next time two asterisks and so on.

Line 70, by the way, just ensures that each time the inner loop prints its quota of asterisks, the next set appear on a new line.

If you can't see what's happening, the programs X and XI should help:

```
10 REM PROGRAM X
20 MODE 6
30 FOR outer% = 1 TO 5
40 FOR inner% = 1 TO outer%
50 PRINT inner%
60 NEXT inner%
70 PRINT CHR$(13)
80 NEXT outer%
```

Once more, the number of times the inner loop is performed depends on the value of the outer loop variable. This time, instead of printing asterisks on a line, we print out the values of `inner%`.

The first time through the outer loop, `inner%` goes from 1 to 1, so we get a:

1

on the screen.

Next time, inner goes from 1 to 2 so we get:

1

2

Once more through, and we see:

1

2

3

and so on.

Can you say what would be the outcome of changing line 30 to:

```
30 FOR outer% = 5 TO 1 STEP -1
```

Finally, Program XI should demonstrate exactly what is happening in Program X.

Each performance of the outer loop is

```
10 REM PROGRAM XI
20 MODE 6
30 FOR outer% = 1 TO 5
40 FOR inner% = 1 TO outer%
50 PRINT "inner loop is from 1 to
"; outer%
60 NEXT inner%
70 PRINT "inner loop is completed"
80 NEXT outer%
```

separated by the message:

inner loop is completed

and the varying range of the inner loop clearly demonstrated.

That's more than enough for one month. If you want to try using the techniques of the last three programs for yourself, how about a program to turn the triangle of asterisks in Program IX upside down?

If you're really ambitious, you could try to print out the successive verses of ten green bottles or, more seasonally, the Twelve Days of Christmas.

Oh yes, Merry Christmas!



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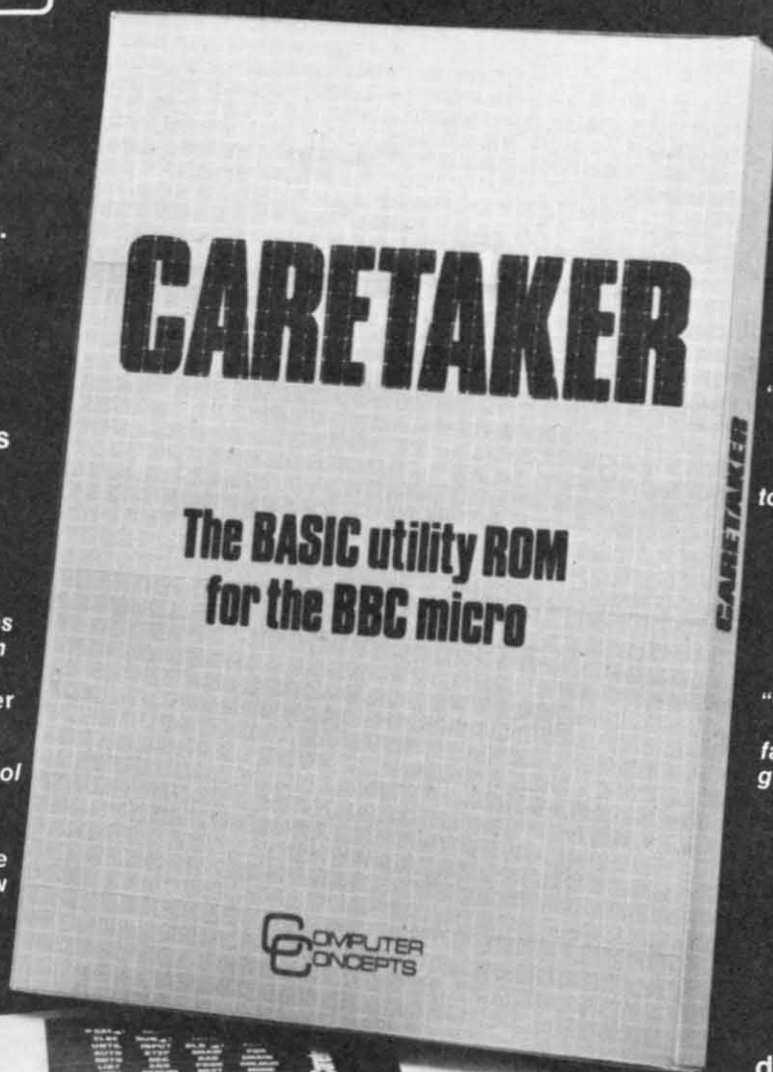
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BBC Micro with ECONET £375
ECONET Upgrade Kit £55
File Server Level 1 £85
File Server Level 2 £215
Printer Server EPROM £41
Clock Terminators (1 pair) £95
10 Station Lead Set £25
ECONET User Guide and Cable £10
TELETEXT Adaptor £195
Acorn Bitstick £328

Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies while not in use. £3.50



EPSON

- EPSON RX80 Printer £213
- EPSON RX80 F/T Printer £225
- EPSON FX80 Printer £316
- EPSON FX100 Printer £435
- SEIKOSHA GP100A £122
- Centronics PRINTER CABLE for all the above printers to interface with the BBC Micro £7

(Securicor carriage charge on printers £7)

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232 £35 RS232 + 2K Buffer £59
IEEE 488 £65 2K Parallel £58

PRINTER INTERFACE BUFFER

This neatly packaged, self-contained unit is supplied complete with all leads, operating manual and power supply. Computer output to the printer is stored in the buffer so that the computer can continue with other tasks while the printer works from the stored contents in the buffer. 16K holds approximately 10 pages of A4, close to the full memory of Wordwise.

Price: 16K £115
Price: 48K £149

Type	Ribbons	Dust Covers
MX80FT	£4.75	
MX100/FX100	£10.00	£5.25
FX80	£4.75	£4.95
RX80	£4.75	£4.50
GP80	£4.50	
GP100	£4.95	£3.95
GP250	£5.95	£3.95
	£18.50	
KAGA KP810	£5.95	£4.75
CANON PW1080	£5.95	£4.75

PRINTER SHARER

This handy UNIT is a solid state switch system designed to ease the problems of short printer leads, continual plugging and unplugging of leads, and costly extra printers by allowing up to three computers to be connected to one printer. It has four parallel Centronics connectors for easy interfacing of the BBC micro to any printer with a Centronics capability such as daisy wheel, dot matrix or plotter type printers. PRINTSHARER is ideal for schools and colleges for sharing their printing resources.

Price: £65 (£2 Carr.)

BROTHER HR-15 DAISY-WHEEL PRINTER

This is a high-quality daisy-wheel printer, for the price of a dot matrix. Daisy-wheel quality gives a professional look to your correspondence. Facilities include 18CPS, bi-directional print, 3K Buffer with clear facility, carriage skip movement, text copy switch, proportional spacing, underlining, bold, shadow, super and sub-script, printing in two colours. Impact control allows use of carbon paper. Connects directly to the BBC micro with centronics parallel interface. RS232 interface is an optional extra. Other options are a single sheet feeder that automatically feeds up to 150 single A4 sheets and a keyboard to transform the printer into a sophisticated electronic typewriter.

SPECIAL OFFER ONLY £339 (carr. £7)

Single Sheet Feeder £195
Electronics KEYBOARD £135
TRACTOR FEED Attachment £90
RIBBON CARTRIDGES:
Fabric £3; Carbon £3; Multistrike £6
DAISYWHEELS (various typefaces) £18

LISTING PAPER (Plain)

1,000 Sheets 9½" Fanfold Paper £7
2,000 Sheets 9½" Fanfold Paper £13
1,000 Sheets 15" Fanfold Paper £9
Teleprinter Roll (Econopaper) £4

Carriage on 1,000 Sheets £1.50

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm £5.50
1,000 90 x 49mm £7.75
1,000 102 x 36mm £6.25

Carriage on Printer Paper or Labels £1.50

Carriage on 1,000 Labels £1.00

All prices exclude VAT

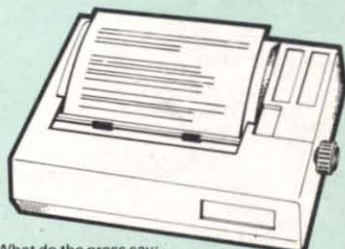
NEW 4 COLOUR PLOTTER PRINTER

How often have you wished you had a colour plotter for your computer, but have been put off by their high cost? Well, Watford Electronics can now supply you with a high quality, low cost plotter with Centronics interface. The SCP-800 printer/plotter facilitates plotting and printing in four colours on paper up to A4 size, using easily replaced pens. It can operate in a text mode, performing like an ordinary printer capable of speeds up to 12 CPS with a maximum of 160 characters per line on A4 paper. In graphics mode it offers full plotting facilities including drawing, moving, scaling of text, rotation and drawing of axes.

At an incredible low price of:

Only £179 (£5 carr.)

KAGA KP810



What do the press say:-

"At £269 this is an unbeatable product for what it has to offer." - Educational Computing.
"Offers excellent value for money." - Electronics & Computing.

This new Japanese printer has EPSON FX/RX compatible control codes and is functionally equivalent to an FX80 with the added advantage of its 'Near Letter Quality' mode. It is solidly built and features include: Normal, Italic, Enlarged, super/subscript, proportional spacing and user-defined character set. Extras over the FX80 included in the price are Near Letter Quality (NLQ) print ideal for correspondence, properadjustable tractor feed, half speed quiet mode and 3K buffer. The printer is bi-directional and logic seeking to give a speed of 140CPS for high throughput in conjunction with the standard 3K buffer. 8K RAM may be added to give more user-defined character sets. Centronics parallel interface + Watford's 12 month NO QUIBBLE WARRANTY.

Special Offer: ONLY £239 (£7 carr.)

RS232 interface + 2K buffer to connect to other micros

£89

KAGA KP910 PRINTER

Very similar to the KP810 but with 17" carriage for really wide print. Gives 156 columns of normal print c 256 columns in condensed mode. This printer is ideal for printing out spreadsheets and can also be used for correspondence in NLQ mode.

ONLY £339 (£7 carr.)

PRINTER LEAD 36"

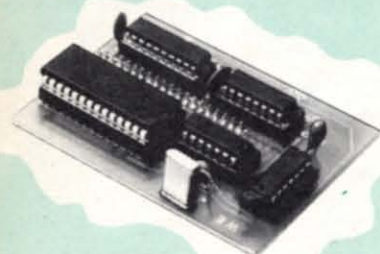
Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

STANDARD (3 foot long)
EXTRA LONG (5 foot long)

£7
£10

Continued

DOUBLE DENSITY DISC INTERFACE



SIMPLE but SOPHISTICATED

We are proud to announce the launch of the Watford Electronics Double Density Board for the BBC micro. The DDFS supplied is a new version of the popular Watford Electronics DFS re-written to make full use of the capabilities of the new double density controller.

- Increases storage capacity of your Disc Drives by the maximum physically possible, 80% !!!
- Our system will use the whole of an 80 track drive. Inferior systems do not allow files longer than 3FFFF bytes, but with our system files can be as long as one disc side.
- Discs may be created in either single or double density format with the built in formatter and in single density mode are fully compatible with normal Acorn format discs.
- The density of the disc you put in is automatically sensed by the system and you are informed of the density in the catalogue display.
- The double density system is of course faster than single density.

The Watford Electronics DDFS implements an extremely comprehensive 8271 emulator so that commands passed through OSWORD & 7F are correctly interpreted. Other manufacturers thought that read and write sector alone were sufficient - we decided to implement every command of the 8271 that was physically possible. We have allowed the use of all the special registers including bad tracks, allowed access to deleted data etc., etc. The emulator itself takes up around 1K of compactly written machine code. We reckon it will run many of the protected discs now available. Gain all the advantages of the WE DFS together with much increased storage and compatibility with many existing protected discs. The price is the same as for the standard single density system that we continue to sell so you can choose between the two options without financial worries.

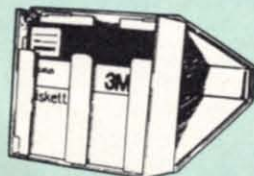
Complete Unit incl. DDFS ROM £85
DDFS Manual £6.95 (no VAT)
We will exchange your existing Single Density Interface for our DDFS Unit for £55 (Carriage £1.50)

* SPECIAL OFFER *

EPROMs for BBC Micro (Hitachi)
2764-250nS £4.75
27128-250nS £16.00

RAMs for BBC Micro (Hitachi)
6116L (2K) £3.75
6264L (8K) £24.00

NEW DESIGN PLASTIC LIBRARY CASES



for Disc Storage 5 1/4" (holds 10) £1.80

DISC DRIVE PRICES SLASHED!

(NEW SLIM-LINE DRIVES)



(DRIVES Cased with Cables; connects directly to your BBC Micro)

- CLS 100 Single, TEC Single sided 40 track, 100K, 5 1/4" Disc Drive £97
- CLS200 Single Drive, Double sided 40 track, 200K, 5 1/4" £129
- CLS400 Single, Mitsubishi Double sided 80 track 400K, 5 1/4" Disc Drive £135
- CLS400S Single, Mitsubishi Double sided 40/80 track Switchable, 400K, 5 1/4" Disc Drive £152
- CLD200 TEC Single sided 40 track 200K, twin 5 1/4" Drives £199
- CLD800 Mitsubishi Double sided 80 track 800K, 5 1/4" TWIN Drives £269
- CLD800S Mitsubishi Double sided 40/80 track switchable, 800K, Drives £299

(CUMANA) DRIVES CASED WITH PSU & CABLES



- CS100 TEC Single sided 40 track 100K 5 1/4" Single Disc Drive £119
- CS200 TEC Single sided 80 track 200K 5 1/4" Single Disc Drive £149
- CS400 Mitsubishi Double sided 80 track 400K 5 1/4" Single Drive £169
- CD200 TEC Single sided 40 track 200K 5 1/4" TWIN Disc Drives £236
- CD400 EPSON Double sided 40 track 400K 5 1/4" TWIN Disc Drives £299
- CD800 Mitsubishi Double sided 80 track 800K 5 1/4" TWIN Drives £349
- CD800S Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives £399
- SPARE DRIVE CABLES, SINGLE £6; DUAL £8
- DFS Manual (comprehensive) £7.50 (No VAT)

P.S.

You do not require a formatting disc nor the expensive 40/80 track switchable drives if you use Watford's sophisticated Disc Filing System which has all these facilities in the ROM.

(Carriage on Disc Drives £7 securicor)

DUST COVERS

(For our Disc Drives)

- Single (without PSU) £3.20
- Twin (without PSU) £3.85
- Single (with PSU) £3.25
- Twin (with PSU) £3.90
- Twin (side by side with PSU) £3.95

5 1/4" DISKETTES

Top quality 3M and XIDEX diskettes with a lifetime guarantee. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied with disk labels and write protect tabs.

- 10 SCOTCH / 3M + labels S/S/D £14
- 10 SCOTCH / 3M + labels S/S/D/D £15
- 10 SCOTCH / 3M + labels D/S/D/D £22
- 10 XIDEX + labels S/S/D/D £15
- 10 XIDEX + labels D/S/D/D £24

DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store up to 20 discs. Each disc can easily be seen through the clear view pockets.

£4.25

LOCKABLE DISK STORAGE UNITS



Strong plastic cases that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 holds upto 40 discs £13

M85 holds upto 95 discs £17

FLOPPY HEAD CLEANER KIT

The heads in a floppy disc drive are precision made and very sensitive to dirt. Drive manufacturers recommend that you clean the heads approximately once a week. Unless your home or office is dust free one of these kits is a very sensible precaution against losing valuable data. A dirty head can destroy many disks before you realise the trouble. Very simple to use.

Only £14

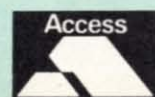
BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE

BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 200K Teac drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer. Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc. 10 x 3M discs, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

ONLY 3 £1,125 (£15 carr.)



ACCESS
HOT LINE
(0923 50234)
24 Hours



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop.

MICROVITEC

- 1431 - Medium resolution as used on the BBC television computer programme ... **£165**
- 1451 - High resolution, suitable for word processing in mode 0 ... **£255**
- 1441 - Super High res, exceeds the capabilities of the BBC micro ... **£385**
- Dust Cover for Microvitecs ... **£5.50**

All Microvitec monitors are 14" RGB in their distinctive right angled case. They come with the connecting lead to the BBC and a mains plug.

KAGA

- Standard resolution with RGB and composite video inputs ... **£195**
- High resolution colour ... **£259**
- KAGA III Super High resolution ... **£349**

Kaga Monitors are 12" RGB colour units housed in an attractive beige plastic cabinet. They all have as standard, a genuine etched anti-glare screen.

ZENITH

12" Ultra high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too - you can really see the detail that has been put into the graphics. **ONLY £68**

LEADS

- BNC Lead for Zenith or Philips ... **£3**
- BNC for Zenith ... **£3**
- RGB lead for KAGA ... **£5**

N.B. Carriage on Monitors **£7** (securicor)

Versatile **BEEB SPEECH SYNTHESISER** Unit



SIMPLY the best! - An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis - That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-IN Library of approximately 500 words to get you started.

ENGLISH accent - Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system - Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit - The whole system is built into a small case - easily tucked behind the computer. Auxiliary output socket provided for direct connection to an external amplifier.

HOURS of fun! - Suitable for any application - Games, Educational Programs, Specialised Packages.

We know this all seems so good to be true but **DON'T BE LEFT SPEECHLESS!** Order your Versatile Speech Unit now!

SPECIAL OFFER £35

Best cost less at WATFORD

WATFORD'S LAUNCH OF THE YEAR APEX

The ultimate expansion system for the BBC microcomputer. It enables you to increase memory capacity to 2+ MEGABYTES including BATTERY BACKED-UP RAM.

The system consists of a mother board which fits inside the BBC and further daughter cards can be connected externally. The internal card has the following features:

- 15 ROM/RAM sockets, 11 of which can be configured as 2716, 2732, 2764, 27128 EPROMS or ROM equivalent devices or as 6264 RAMs. Any RAM is Automatically battery backed-up and its contents preserved when the power is turned off.

- The battery is recharged every time the machine is turned on and lasts several months, depending on the number of RAMs fitted.

- There is very little extra current drain, even with a fully loaded board as only the presently active ROM is powered up. In fact the fully populated board uses only 300mA.

- The board reduces micro bus loading by up to three ROM loads, which improves reliability and performance.

- Installation is extremely simple. There is no soldering required. The board is rigidly held by two 40 pin sockets and five support posts. A ribbon cable can be brought outside the computer and up to 8 external cards added. This enables the user to plug-in up to 142 paged ROMs. The cards have following features:

- Each card can accommodate up to 16 devices each of which can be configured as 2716, 2732, 2764, 27128 ROMs or 6264 8K RAMs.

- Battery backup is provided from the internal card.

- Only the active ROM is powered up permitting many external ROMs to be added with very little current loading (100mA per card).

The system comes with controlling software in ROM. The utilities supplied are as follows:

- ★ APEX - replies with the device number currently being accessed.

- ★ APEX C - toggles between the colour and standard black and white messages.

- ★ AL - loads from any device, regardless of the data type.

- ★ AS - saves memory to any specified RAM device.

- ★ AD - prints a directory of the devices present in the system, i.e. ROMs present and files stored. This also reports on the amount of free storage space.

- ★ AF - asks for the free RAM devices.

- ★ LA - repeats the last command to paged ROMs.

Continued

★ AT - enters a memory testing routine. This will write a test pattern into the memory and read it back out again. If a fault is found, it is reported to the user. This test continues until Escape is pressed.

- RDISC - activates APEX as a filing system which then treats all free APEX RAM in the system as a continuous 'RAM-DISC'. All commands have similar format to the DFS and transfer is possible between the two systems.

The complete computer system bus is available to the user, so that other cards/devices could be added such as EPROM programmers, second processors, Winchester disc drives, clocks, etc. By racking the cards you eliminate the tangled mass of cables that usually accumulates around the micro.

A comprehensive operating manual is supplied with every APEX Board. Please write in for further details and prices.

THE ULTIMATE DFS FOR BBC MICRO

by

Watford Electronics

Highly acclaimed at The ACORN and BBC MICRO USER Shows. What do the independent press say?

Good value for money - *Beebug Aug. '83*

A very worthwhile package - *The Micro User*

You'll be buying a very powerful package - *Personal Computer News*

Superior DFS; Excellent disc sector editor - *Computer Answers*

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

Please write in for full technical specification.

PRICES:

DFS (Disc Filing System) ROM **£25**

Complete Disc Interface Kit including DFS ROM & Fitting instructions P.O.A.

Disc Filing System Manual. Comprehensive and clearly written **£7.50 (no VAT)**

P.S. We will exchange your existing ACORN DFS or PACE (AMCOM) DFS for Watford's highly sophisticated 16K DFS ROM for **£19**

Watford's DFS is exclusively available from Watford Electronics. We do NOT retail through any dealers. Every ROM carries a label with our LOGO and a serial number.

Now available:
Acorn DFS Kit **£99**

**NEW
RELEASE**

MYSTRIES OF DISC DRIVES & DFS REVEALED

Price: **£5.95** (Book - No VAT)

Continued

BEEB PRINTER ROM



This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

- ★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
- ★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
- ★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
- ★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
- ★ Commands select the options for the following printers: GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
- Operates with either parallel or serial interfaces.
- ★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate - if anyone can supply flashing ink we would like to know!

The ROM also provides window setting facilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. Two commands are used to operate the dump routines:

*GIMAGE - This provides a full graphics dump of any Mode (including Mode 8). There are various optional parameters but you need only specify the parameters you wish to change.

● V <scale>, H <scale> - These 2 byte numbers give fine control over the size of the dump from minute to enormous. Unlike other dump ROMs the scale does not change with mode.

● R <0-3> - Print dump rotated by 0.90, 180, 270 degrees.

● I <indent> - Set gap from left edge of paper.

● X <min>, <max>, Y <min>, <max> - The whole of the screen graphics window area is dumped except when these parameters are given.

● P - Physical colour values are used for plotting, otherwise a negative scale is used (white darkest).

● T Two tone dump for maximum resolution.

● M <mask> - 8 bit colour mask.

● E - Contrast expansion to make mode 7-text and separated graphics stand out from the background.

● C - All mode 7 graphics are printed as contiguous to improve the shading in graphic areas.

*TIMAGE <indent> - Does a fast, text only, dump of the contents of the text window in any mode.

*GWINDOW and *TWINDOW - These commands draw the graphics and text windows, respectively, on the screen and allow them to be changed with the cursor keys. N.B. GIMAGE and GWINDOW work fully in mode 7.

Designed for use with the following printers: CP80, GP80, GP100, GP250, STAR, KAGA/TAXAN, NEC, SHINWA, GEMINI, EPSON MX/RX/FX/LPVII, DMP 100/120/200/400, CANON.

Price including comprehensive manual

£22

EPSON DUMP ROM

This screen dump ROM is specifically designed for use with the Epson RX/FX printers and the Kaga KP810. It is extremely simple to use as there is only one command to remember. It will accurately dump any screen mode using multiple tones as required. Mode 7 is fully supported giving teletext graphics, double height etc. For those who like to keep life simple this EPROM is only

£20.

NEW
LAUNCH

EPSON FX/RX LETTER QUALITY PRINT ROM

Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used separately or in any combination.
- Full UK character set.

Standard 'pica size'
Proportional spacing
Enlarged
Underlined
Normal type

The NLQ ROM is incredibly easy to fit and use. Supplied complete with Manual.

Only: £20

NEW
RELEASE

THE EPSON FX/KAGA PRINTER COMMANDS REVEALED

for the BBC Microcomputer
(The only Printer Book for the Epson FX-80 compatible printers).

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities - he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled THE EPSON FX/KAGA PRINTER COMMANDS REVEALED.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

This book is superb value at only
£5.95 (Book - No VAT)

FORTH ROM for BBC

This ROM provides a complete implementation of the FIG-FORTH standard (including editor). Supplied with a large tutorial manual at only

£33

TINY PASCAL for BBC Micro £59

ULTRACALC

A very sophisticated ROM based spreadsheet (upgraded version) from BBC Publications. The new ROM has more power and flexibility.

Features:

- Operation in any screen mode.
- Greater printer flexibility incl. control codes & E sign definition.
- Runs as 'HICALC' on a 6502 second processor to allow 44K of workspace in any screen mode.
- Spooling of ASCII text files for subsequent use with any word processor.
- Several additional layout options.

Price £65

VIEW

VIEW WORDPROCESSOR

We are supplying the new VIEW version 2.1 allowing printing of memory contents etc. ... £46

HIGHVIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft)

£49

NEW
RELEASE

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Watford Electronics are now able to supply a new View Driver package to complement any View wordprocessor system using the Brother HR15 and Juki 6100 daisywheel printers.

The facilities offered by this driver are:

- Auto Underlining
- Bold
- Shadow
- Superscript
- Subscript
- Proportional spacing
- Pad character facility

The program is supplied on a 40/80 track disc with full instructions for its use.

Only £9

FX80 PRINTER DRIVER

Watford's own Sophisticated VIEW Printer Driver for FX80

To simplify using the full facilities of the Epson FX80 or Kaga KP810 use this printer driver. Full facilities are provided for selecting between fonts etc. The disc includes examples of use and instructions. Available on 40 or 80 track disc (please state which required).

£6

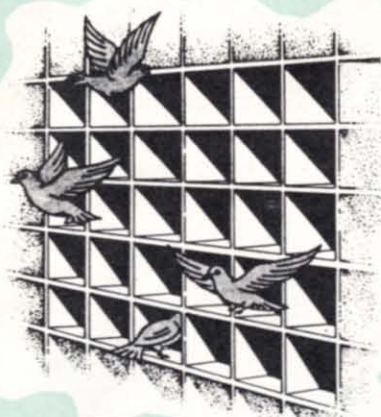
VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of Printers and Typewriters. The View driver allows access to all of the features supported by the range of daisy wheel printers (EXP 770/400/500/550). These include underlining, bold, shadow, superscript, and subscript printing. Additionally, you can use proportional spacing on the EXP 770. Owners of one of the typewriters in the range EX 55/44/43, using it as a printer, can also access underlining with these drivers.

The printer drivers also extend the facilities in View to allow the use of pad characters. The printer driver on disk with a user manual is at a special introductory price of £7. Please specify printer type when ordering.

TWO DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

Despite the ease of use this system provides all the facilities needed for complex data handling problems. The length of database that can be handled is only limited by the total space on the disc. You can have up to 20 fields with page length records up to 254 bytes in length. Adding and deleting records, amend titles, field names and records. Sort on any field and search for any record or group of records in any field. The database may be re-formatted after creation, the system will re-write all your files for you automatically. You may add extra fields and extend the length of existing fields freely. Output formatting is very powerful. You are allowed 40, 80 or 132 column output modes going to printer or screen. Selected fields can be put in any order on the screen or printer, either across the paper or down. Output can start or stop anywhere in the file. Decimal fields are automatically totalled and records output are counted. Version 2, now on sale has improved input and amendments procedures giving full record edit as well as the 3 extra features... String searching. Calculations on numeric fields, and the ability to create sub files from your main files.

On disc at **Only £17**
(Please specify 40 or 80 track when ordering)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer. File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density.

The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.

Cont.

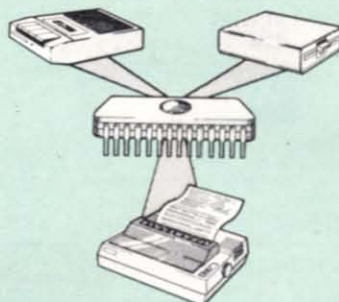
Operations supported are -, +, *, /, +9999999999999999 and compare facilities =, >, <, <=, >=, < & >.

Many keywords are supported by the language: assign, compare, display, end, goto, if, lift, print, read, search, spool and update. Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

Only £43

(Please specify 40 or 80 tracks for the utilities disc)

BUFFER & BACKUP ROM



For those with sideways RAM fitted in their machines this utility ROM will make full use of this facility. By using the sideways RAM area for extra memory the following features are implemented:

- ★ 4K or 16K buffer for parallel printer.
- ★ Dumps selection of Disc files to Tape.
- ★ Makes backup copies of tapes on to tape and disc.
- ★ Displays contents of paged ROMs on screen.
- ★ Menu display of ROM filing system contents on Shift-Break.
- ★ Comprehensive manual.

Only £22

DATAGEM

Gemini's 24K ROM based
DATABASE Management System
Special Introductory Offer: **£99**

PEN PAL - VERSATILE LIGHT PEN SOFTWARE

Do you have a light pen that never gets used? Then this piece of software is for you. This package offers many useful facilities that make the light pen a useful device to own. Facilities included are:

- Pixel, Line and Character definition
 - Free hand drawing
 - All Colours
 - Fill, Refill and stripes
 - User defined "Brush strokes" plus character definer
 - Grid, Scale and perspective aids 2 to 200 points palletable in one design with Circles and "rubber banding"
 - Move design/character to any screen position
 - Save and Load screens. User defined characters and line drawings for video titles, own programmes etc.
- This program has many uses in education and at home. It is supplied with a comprehensive instruction manual. Works with Watford, RH, Acorn User, DIY and many other Light Pens.

Prices

TAPE	£10
DISC (40 or 80)	£11

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your cassette programs to disc. If you have difficulties transferring your cassette software to your disc system then this is the answer. It handles "locked" files and full length adventures (up to &e blocks) and programs that load below &E00. It is very simple to operate with instructions supplied. It saves you time and money.

Price £10

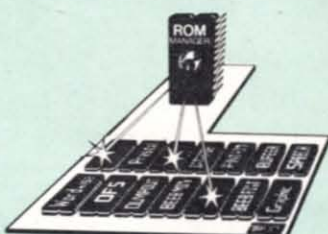
(Please specify 40 or 80 track discs)

ADE

Complete program development package in a 16K ROM. Full assembling and debugging facilities provided.

SPECIAL OFFER ONLY £43

ROM MANAGER



This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.

ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.

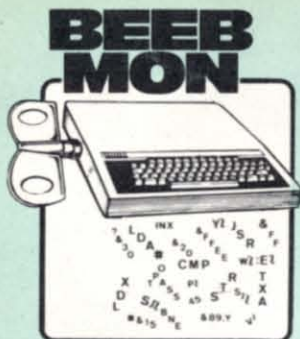
The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

The commands given in the ROM:

- ★ **CHECKSUM** - Generates a CRC for a specified ROM (useful for testing suspected faulty ROMs).
 - ★ **DIRECT** - Passes a command directly to a named ROM (overcomes command name clashes).
 - ★ **EXAMINE** - Allows examination of a named ROM.
 - ★ **EXPLAIN** - Gives detailed explanation of the first 22 *FX codes.
 - ★ **FILE** - Passes a command directly to the current filing system (which normally receives commands after all the ROMs).
 - ★ **FUNCTION** - Lists the contents of the function keys in a form suitable for editing.
 - ★ **INCLUDE** - Allows the main memory to be used for ROM development.
 - ★ **MODIFY** - Memory editing in HEX/ASCII format.
 - ★ **NAMES** - Lists the names and socket numbers of all resident ROMs.
 - ★ **RAM** - Sends command directly to the RAM based ROM routine.
 - ★ **REMOVE** - Removes RAM based ROM option.
 - ★ **SPECIFY** - Selects the default ROM.
 - ★ **DEFAULT** - Sends commands directly to the default ROM without having to give its name.
 - ★ **STOP** and **START** - Disable and enable any named ROM to completely eliminate command word clashes.
 - ★ **STATUS** - Information about all the ROMs fitted in the machine including socket number, name, length, whether it is enabled, whether it has service or language entries etc.
 - ★ **VALUES** - Gives ROM MANAGER status information, such as its socket number, how many ROMs have higher priority, number of default ROM and the identity of the current filing system.
 - ★ **VECTOR** - Same as *DIRECT, just in case *DIRECT clashes with another ROM.
- All selection between particular ROMs is by the name of the ROM and this may be abbreviated for convenience. ROM numbers can also be used if required. This ROM is very simple and obvious to use. All the facilities are explained in the clear and detailed manual.

Price £22

Continued →



Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.

In use as a debugging tool, you run code under a total emulation system. Everfelt a desperate urge to set a breakpoint in ROM? No problem - you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.

Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a virtual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being executed at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

£22



Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use programmers tool. A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL, ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled. Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.

ONLY £18

WATFORD - Always a step ahead

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: £32

SPELLCHECK DISC

for Wordwise
Only: £16

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in any of the following styles:-

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ

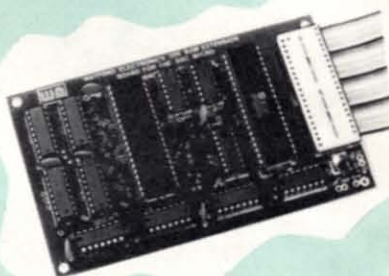
It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V - press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.

You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters. A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY £39

NEW

Watford fills the gap with the 32K RAM EXPANSION BOARD for the BBC Micro



Now Watford Electronics brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. This compact board which fits inside the computer doesn't just give you 16k or even 20k of extra RAM, but a massive 32K !!! There are many more useful facilities available with this board:

- The top 20K of the expansion RAM can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage. This allows good graphics and long programs to be combined. For instance you could have MODE 0/1/2 GRAPHICS AND 28K OF PROGRAM SPACE. The extra memory can be used by virtually any language or utility such as BASIC, VIEW, WORDWISE, etc.

- The FULL 32K or the bottom 12K of the expansion RAM can be used as a PRINTER BUFFER for SERIAL or PARALLEL printers, sound channels, RS423, Keyboard or Speech Synthesiser. This allows very long text files to be printed while you are using 28K of program and 20K of graphics! THE BUFFER IS UNIQUE because it replaces one of the BBC Micro's buffers so all the buffer options are available on it. e.g. *FX15,21,138,145,ADVAL(-no.) etc.

- This board is the ideal complement to any word processing system, disc or cassette based. There is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on - TWO JOBS DONE SIMULTANEOUSLY!!! (an equivalent printer buffer would cost you £120 +)

- Unlike our competitors, the board is compatible with a vast range of software and hardware available for the BBC microcomputer, including our ROM expansion board, double density DFS Units and the ATPL ROM extension board. This is because our board is connected to the computer by means of a ribbon cable without soldering. It can be either left in the micro or stuck to the lid with the 4 self adhesive feet supplied.

- The board comes with a comprehensive manual and ROM based software with a large range of commands for machine code and BASIC users, including many *HELP messages.

SPECIAL OFFER

Only: £69 (carr. £1)

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimension to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER £99

LIGHT PEN

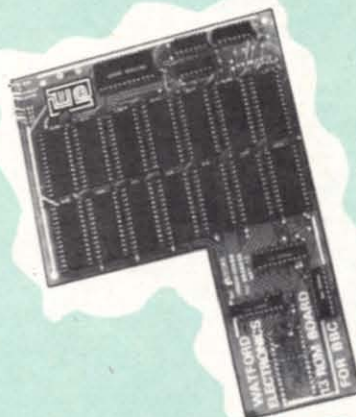


This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only £20

(For software on disc please add £2)

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered - On board battery back-up facility - will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead). Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets up to full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold up to 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

CHRISTMAS OFFER: £28 (carr. £1)

APPROVED for use with telecommunication systems run by British Telecom in accordance with the conditions in the instructions for use.

MODEM 84 PRESTEL TERMINAL For the BBC Microcomputer



The Watford Prestel package consists of the B.T. approved Watford MODEM 84 (1200/75 baud full duplex 1200 baud half duplex direct connect) and a very sophisticated Prestel Terminal ROM.

This totally machine code software:

- is fully compatible with not only the Modem 84 but also with the PRISM 1000 and most other modems that require a data link via an RS423/RS232 port making it a worthwhile purchase for those who already have Modems.
- supports full Prestel colour alpha and graphic characters including double height, flashing, conceal/reveal.
- called by simple *PRESTEL (*P) command. Disc and tape configurations fully supported.
- includes a comprehensive telesoftware downloader for BBC and other programs with continuous on screen status report (an essential facility).
- has very powerful OFF LINE MAILBOX editor allowing colour flashing graphic mailboxes to be prepared without having to be on line to Prestel.
- auto logon sequence can be burnt into ROM if desired.
- a vital 'TAG' facility allows tagging and recall of interesting pages, avoids that common and annoying 'NOW WHERE WAS THAT PAGE' problem.
- includes simple page and program loading and saving functions for both disc and tape, automatically assigning frame and program directories.
- not one but TWO PRINTER DUMP ROUTINES are provided within the software allowing either full graphics dump (mode 7 to EPSON compatible printers) or ASCII characters only.
- a user function built into the software allows interface with specialist routines, (yours as well as ours).

WATFORD'S 1200 BAUD FULLY AUTOMATIC USER TO USER SOFTWARE

The addition of the WATFORD user to user ROM based software enables you to discover a whole new world of data communication.

This software enables you to use the MODEM 84 very powerfully.

- Send and receive error checked programs and files (even WORDWISE files) to and from other users at 1200 baud.
- 8k file transfer in under 2.5 minutes (approx four times faster than with 300 baud modems).
- The transfer of data is totally AUTOMATIC which means that the modem is automatically switched between transmit and receive under software control.
- A chat mode is provided which also has this automatic switching for receive and transmit. (This mode is essential just before and after data transfer when both hand sets are replaced to reduce noise).
- A copy facility is provided which allows transmission of all screen output.
- A continuous on screen modem status report is included.
- The software is totally function key driven enabling easy transmission, reception, saving and loading of programs and files (Basic, Machine code or Data).
- A help menu is available from within the software as an aid to use.
- Full instructions are supplied.

PRICES

MODEM 84 (with Lead & Manual)	£68
MODEM 84 complete with PRESTEL SOFTWARE ROM, Lead and Manuals	£82
PRESTEL SOFTWARE ROM + Manual	£20
USER to USER SOFTWARE ROM	£15
(Carriage on Modem £2)	

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. Suitable for computers, Hi-Fi, Fridge Freezers etc. Max. Surge current 2Kamp; max. Voltage 250. Essential for serious computer users.

Protection for only **£8.50**

Continued

SIDWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort - no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

● Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.

● The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY £16 (£1 carr.)

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
36 Challenging Games for BBC	£5.95
40 Educational Programs for BBC	£5.95
100 Programs for BBC Micro	£6.95
Cassette version of above	£10.00
6502 Application Book	£11.95
6502 Assembly Language Program ..	£13.95
6502 Assembly Language Subroutines	£14.25
6502 Machine Code for Beginners	£5.95
6502 Machine code for Humans	£7.95
6502 Software Design	£10.50
A young persons guide to BBC Basic ...	£4.50
A Beginners guide to LISP	£10.95
Advanced Machine Code Technique for BBC	£7.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC Basic	£7.95
Assembly Lang. Prog. on BBC	£7.40
BBC BASIC	£5.95
BBC Computer Magic	£5.50
BBC DIY Robotics & Sensors	£6.95
BBC Forth	£7.50
BBC Lisp	£7.50
BBC Micro An Expert Guide	£6.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro ROM PAGING System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Assembly Lang. Prog.	£7.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
Basic Programming on BBC Micro	£5.95
CP/M The software BUS	£8.95
CP/M Users Guide	£13.95
Creating Adventure Programs on BBC Micros	£6.95
Creative Graphics Cassette (Acornsoft). Has 36 graphics programs	£8.95
Creative graphics on BBC Micro	£7.50
Complete Programmer for BBC	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
DIY Robotics & Sensors with BBC	£6.95
Exploring FORTH	£6.95
Further Prog. for BBC Micro	£5.95
FORTH Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games on your BBC Micro	£2.95
Games BBC Computer Can Play	£6.95
Getting more from your BBC & Electron	£6.95
Graphs & Charts on BBC Micro	£7.50
Graphic Art for BBC Computer	£5.95
Graphs and Charts (Cassette)	£7.50
Introducing the BBC Micro	£5.95
Introduction to FORTH	£9.30
Interfacing projects for the BBC Micro	£6.95
Introducing LOGO	£5.95
Let your BBC teach u to program	£6.45
LISP	£9.25
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	£5.95
Mastering CP/M	£13.65
Programming the 6502	£11.95
Programming the Z80	£14.25
PASCAL	£9.25
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Epson FX/KATA PRINTER Commands REVEALED	£5.95
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Using 6502 Ass. Language	£14.50
Wordstar & CP/M made easy	£6.95

NEW
LAUNCH

MYSTERIES OF DISC DRIVES AND DFS REVEALED

Are you tired of faulty cassettes and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford Electronic's new book entitled 'MYSTERIES OF DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

There is even a handy section describing the phrases you are likely to encounter, and how to interpret them. This book must be an essential purchase at £5.95, especially if you own or are thinking of buying a disc system. Why not ask for a copy for Christmas?

Price **£5.95** (Book - No VAT)

THE INVESTIGATOR

A utility program provided on disc to make security backup copies of all your valuable discs. Makes full use of all 8271 facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Price **£25**

PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. BBC micro plinths have slots for maximum ventilation. Single height version is suitable for BBC and monitor. Double height version allows the disc drives to be used in the centre section or stationary, etc. The computer slides easily into place, allowing easy access to remove the lid.

The printer plinth is equally sturdy but without the cooling slots. This allows the paper to be stacked under the plinth with the printer on top - a very convenient way to work as it does not require the usual very deep table.

SINGLE BBC PLINTH **£11** (carr. £1.50)
DOUBLE BBC PLINTH **£20** (carr. £2.00)
PRINTER PLINTH **10** (carr. £1.50)

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.50

EPROM PROGRAMMER



The Watford Electronics EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed - wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and integrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File - Save File - Down Load EPROM - Program EPROM - Verify - Blank Check - Editing of memory contents prior to programming. Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

CHRISTMAS OFFER £69

(£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** - Standard version erases up to 16 chips. **£28**
- **ERASER GT** - Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**
- Spare UV tubes. **£9**

VOLTMACE DELTA 14 JOYSTICK SYSTEM

The Voltmace system provides full facilities for connecting the Delta 14 handset. Delta 14 handset - On its own makes a high quality centre sprung analogue joystick with fire buttons **£12.50**
Adaptor Module allows use of two joysticks and provides hardware to access all the keys on the keypad of the joystick **£12.55**
Transfer program allows use of the keypad keys and joystick to simulate any key on the keyboard. This works by creating a machine code patch that stays in memory while another program is loaded in. Allows any game to be used with joysticks. Supplied on disc or tape.

Tape **£5.10** Disc **£7.95**

STANDARD JOYSTICKS

These are standard analogue type with a fire button on each joystick. Twin joysticks go to a single moulded plug, long leads provided.

Single Player version **£7.00**
Two Players version **£12.00**

ANTI GLARE MONITOR SAFETY SCREEN



HEADACHES? TIRED EYES? Don't take pills — Use a Watford Electronics anti-glare filter! Considerable research into the possible health problems associated with monitor screens has shown that eye strain, blurred vision, watering, itching eyes and headaches can result after prolonged use. The problems are caused by extraneous reflections which force the eye to continuously re-focus to try to ignore them. The answer is our contrast enhancement, anti-glare filter which is similar to those which have been previously available on business systems, but at the low cost that you would expect for your personal computer. You will soon find the reduction in eye strain well worth your investment.

Features:

- Simple fitting with sticky Velcro pads.
 - Easily removed for cleaning.
 - Tinting improves colour quality and contrast.
 - Works on monochrome or colour monitors.
 - Curved instead of usual flat screen reduces edge distortion.
 - Made in Britain by a long established glass maker.
- Available in 9", 12" and 14" versions — please specify when ordering.

Introductory offer price: **£14.95 (carr. £1)**

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£12 (£2 carr.)**

DATA RECORDER AND ACCESSORIES

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IF there were a pedigree organisation which held the details of the parentage of computer games then the entry for this program would read as follows:

Galaxy Raiders, sired by Star Trek out of 3D Space Ranger.

As you might have guessed, **Galaxy Raiders** from Visions is a space, shoot'em-up type game but with the added feature of strategy.

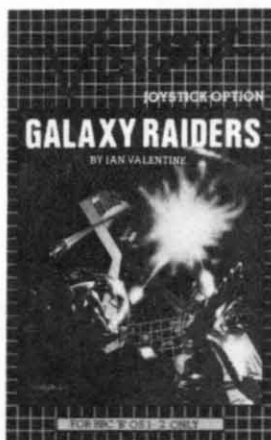
As in *Star Trek* there is a whole galaxy to explore which, for convenience, is split into various sectors.

When you are in a sector you can search out the enemy ships and try to destroy them before they get the same idea and try to damage you.

There is a computer to help you in targeting your phaser and missile weapons systems and full range and target information printed on the head up display.

Your list of enemies is far greater than just the fleet who try to destroy your ship. Almost as dangerous is the lack of energy,

Raiders shows its high breeding



which you can see being constantly depleted as you survey the galaxy. Strategy is therefore not only desirable but essential when playing this game.

There are almost as many

controls as you have fingers to touch the keys. Direction can be set to either joystick or keyboard input, both of which are very responsive. Twenty other keys control the rest of the game.

There are three types of alien in the display which act differently and are valued to differing degrees. The fighters are the easiest to kill, with carriers being almost indestructible by phasers. They do tend to fall to well targeted missiles though.

While you are engaging all the aliens in your current sector the others are surrounding and destroying your friendly starbases.

All told, quite a difficult

problem. As you can see from this description, which doesn't even begin to explain all the nuances, this is a complex yet enthralling game to play.

The instruction book covers some 10 pages and is well written, explaining all the options in detail.

Being a fully machine code game the response to your commands is almost instant and this adds to the 'real time' feel of the game.

If you want to try being Buck Rodgers or even Captain Kirk, this could be the game for you.

It is certainly worth a second glance for all those who are getting tired of arcade games.

Dave Carlos

Fmon has that rare substance - quality

PRONOUNCED eff-mon rather than **Fmon**, this is a simple package consisting of a program on tape and a manual.

The brief from Fsoft describes it as a powerful machine code monitor for the BBC Micro. On the surface it appears similar to other available packages, some of which are provided in ROM.

However, despite appearances this is a program somewhat out of the ordinary. It is good software, professional and complete, complex but under no pretence as to its limitations, well written and adequately explained.

It is a package which exudes that intangible substance - quality.

To back up this statement, it is necessary to explain what it does. To quote the manual again, it includes "a disassembler, a relocater, a line assembler, a trace mode, break points, user defined variables, fully recursive procedures and

full support of MOS and VDU commands".

In other words if you wish to debug machine code programs, write small test programs in assembler, develop ROM based software, or simply satisfy your curiosity about the contents of memory, all that is required is to load this into a spare(?) 5k and set off.

At the programmer's disposal are a number of one letter commands which can be strung together into sentences or used in isolation.

The commands fall into three categories, the first of which allows manipulation of numbers in three general purpose registers called system variables.

The second category use the numbers in the system variables as arguments when performing various tasks.

These include block moves, disassembly, subroutine jumps, tracing, hex and Ascii dumps of memory, string searches and a

very powerful machine code relocation command - to mention but a few of the many available.

The third category might be termed miscellaneous commands. These do not use the system variables but merely serve to make the package more powerful and easier to use.

The most notable of these powerful features is definition of fully recursive procedures - macros - and user variables.

These can be saved and restored from disc or tape so a number of standard macros can be defined for commonly used operations - the example given in the documentation is a hex dump of zero page.

It is designed to serve those familiar with the workings of the BBC Micro and with 6502 machine code. Given this, programmers should seriously consider including it as a prized utility in their toolbox.

David Williams



Alligata
For BBC, Model B

You Tarzan - go find Jane!

IT may be several years since I read the book but I can't for the life of me remember any encounters between our lovin' clothed hero and the gnashing teeth, let alone the mutant eyes of **Tarzan** (Alligata Software).

In this revamped version of the classic story, Tarzan the apeman must battle his way through four successive screens

From Page 49

of fearsome action to eventually rescue his true love Jane.

Should you wish to take a sneak preview of the terrors in store then do nothing and the program will enter its Demo mode, displaying each of the four screens for a few seconds.

All characters are drawn on a small scale enabling the programmer to create some quite complex screen displays for Tarzan to negotiate.

You must guide Tarzan from his initial position to a small arrow on a post. Points are awarded when you reach this position and you begin the next screen.

Unfortunately the odd method of displaying the score is the program's only failing. When a game is over the program returns to the title screen, but your score does not form part of this display.

You must wait until the program enters its Demo mode.

As far as a high score table is concerned try using a pencil and paper.

The four screens consist of a series of ravines to be jumped, baddies to be avoided, streams

to be crossed on logs, and lifts(?).

Fortunately this Tarzan chapie is remarkably tough and when falling from great heights, normally due to mistimed leaps, suffers very little damage unless he falls on a baddie.

One of the more cute characters of the scenario is a gorilla which sits at the top of the screen casually lobbing dirty great coconuts at our hero.

Despite the scoring system there is no doubt that I will be donning the old loin cloth again and plunging into the depths of the jungle till I eventually reach Jane.

Jon Revis

Novel twist against the najjers

YOU are in charge of a remote asteroid refuelling base whose silos contain millions of litres of liquid oxygen. These you must guard with your life – or more effectively with your powerful

laser cannon – against the usual hordes of marauding najjers.

The novel twist in **Laser Reflex** from Talent Computer Systems is that your laser uses a mirror at the edge of the screen to angle the fire-power in any direction. You shoot at the mirror and the laser beam reflects at an angle dependent on the position of your base.

Your laser batteries need recharging after a few shots, meaning that you must stay at the far left of the screen for a while, thus ruining your long-distance pot shots.

At the start of the game a shield protects the tops of the silos. This is soon rendered useless by constant bombardment, leaving you alone to save the universe.

If any of the creatures get through they start to construct a system of pipes on the tops of the silos. When enough drones have got through to complete the piping you lose one of your three lives.

Your go is timed, though this is for your use only and plays no part in the game. The program keeps a record of the highest score but I found the starting value quite difficult to beat.

As you progress in the game

the aliens get meaner, quicker and diversify into many strange forms.

The graphics are extremely impressive, especially the background scenario of the silos and piping. Unfortunately not enough attention has been paid to your own base which would be hard to distinguish but for its frequent movement.

The program is Electron compatible, so the sound is not up to BBC standards. I hope that this compatibility doesn't become common practice with software houses. After all the Beeb users were here first!

The documentation was extremely comprehensive, even telling me to connect my television and check that the Beeb is plugged in. As a security measure, the machine must be turned off and then on before the program is loaded or else it will crash when loading is complete.

This even applies if the system has only just been powered up.

Pressing Break returns the programs to the title page, though if this is done repeatedly then the game doesn't run.

Too much effort has gone into brilliant but confusing graphics while too little has gone into the game itself, which is little more

QUICK RUNS

A first look at some of the latest releases

Anti-Aircraft Gun Simulator: Using pre-select keys or joystick, you must shoot down the enemy before it gets chance to destroy the city. Your long range scan warns of impending attack and there are three levels of difficulty. (Software Division)

★ ★ ★

Sadim's Castle: In this text-only adventure you must search for the hidden remains of Leonora, the unfaithful wife of Lord Sadim. Hidden away by her husband, long before his death, her whereabouts have puzzled and seen off many before you. (MP)

★ ★ ★

Valley of the Kings: Text-only adventure in which you must find the golden mask of the pyramid of Kaculud. Something has caused the archeologists to abandon their camp and flee. Dare you face what has caused their disappearance? (MP)

★ ★ ★

Sinbad: Try to complete Sinbad's journey. You must run, jump and climb onto your magic carpet in pursuit of your goal.

Beware! The higher you go, the harder you fall as you avoid the spiders and snakes. (Virgin)

★ ★ ★

SAS Commander: You face terrorists in a street shoot out. There are three different scenes and you can only pass onto the next by killing all the enemy on one particular screen. The further you get the more enemy appear and the faster they fire. A high score competition offers a first prize of £50 plus £20 worth of software. (Comsoft)

★ ★ ★

Custard Pie Fight: A one or two player game set in the kitchen, in which you take on the role of a chef. Battle it out with your opponent between the fridge and the cooker using custard pies as ammunition. Each level gets faster. You enter at the level of your choice. (Comsoft)

★ ★ ★

Son of Bagger: Relive the exploits of Roger the Dodger through his prodigy, Slippery Sid. Having entered the National Security

HQ on a spying mission you must search for golden keys to escape. Watch out for the security guards and be careful the floor doesn't disappear from under you. (Alligata)

★ ★ ★

Spaceman Sid: Drive your combat rover across the Tribos landscape as you try to regain the dilithium crystal mines from the Martians. Equipped with an XR5 laser you must infiltrate the Martian defences and destroy the command camps. (English)

★ ★ ★

Plutonium Plunder: Surrounded by gnomes you must push plutonium cannisters behind a safety barrier. Get the gnomes first by crushing them with the Hexoid pods or the cannisters, or stun them by firing at them. Avoid at all costs the electrified wall but don't take too long, for all sorts of nasties are waiting to appear on the scene. (Micropower)

★ ★ ★

Felix Meets the Evil Weevils: Felix must spray the Weevils with pesticide before they

than turbo-charged Space Invaders.

Having said that, good luck Talent Systems. With the software around today you'll need it!

Philip Tudor

Look out for Brian!

BUG Blaster (Alligata) is an excellent "Centipede" game for the dedicated midnight key basher. As in the arcade version, you shoot from the bottom of the screen at the lurid multi-segmented centipede as it dodges between mushrooms, slowly making its way towards you.

While you're busy zapping away, mean little red spiders sneak up and new rows of mushrooms pop up in the path of a strange green thing which wanders around with a tuneless hum every now and then.

Added hazards include Brian, the mushroom poisoning scorpion.

A quality version of a classic computer game - highly recommended.

Jane Jackson

Bring the magic of the ospreys into your home

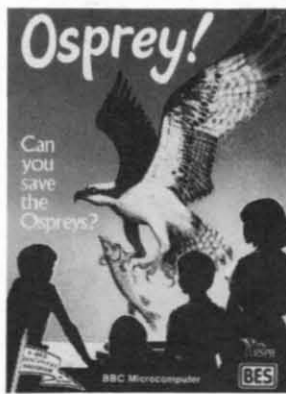
I WAS lucky enough to be able to spend two weeks in Scotland this summer and the highlight of the trip was my visit to see the nesting ospreys at Loch Garten.

So when **Osprey!** from Bourne Educational Software arrived in the office, I grabbed it with enthusiasm. I wasn't disappointed.

Produced in conjunction with the RSPB, and with an excellent 32 page colour booklet to complement the program, it's a fascinating simulation of the problems faced by the osprey as a Scottish breeding bird.

You are the manager of a nature reserve where ospreys are nesting. The booklet has given you an outline of the bird's history and you have to pick which year you want the simulation to start. The earlier the year, the harder the game.

Your aim is to make sure the birds successfully breed and rear their chicks. To do this you have



to decide what your wardens are going to do during the vital spring and summer seasons.

Some are needed to chase away egg stealers while others have to manage the site and keep disturbance from visitors to a minimum. Also wardens have to be spared to make people aware of the ospreys and to encourage public support.

And, just like real life, when you've made your choices and allocated your resources you sit back and watch what happens.

The graphics are beautiful, painting a picture of the reserve and the nest site. You can watch as the ospreys swoop down to fish and take them to the nest. Sadly, if you haven't allocated enough wardens to guard duty, you can also watch the egg thieves at work.

Even the visitors can be a nuisance, their cars disturbing the birds if you haven't picked the right number of site wardens. And to make it worse factors totally out of your control such as the weather affect the final result.

Your success or failure at one reserve is taken as representative of the whole of Scotland and after the spring season you are shown how the osprey population has fared under your

reach the pulsating mutation chamber and become Superweevils. Watch out for deadly ball-bearings which roll along the conveyors. You can reverse the direction of the conveyors, replenish your oxygen, and use the 'panic' button to make you immune. (Micropower)

★ ★ ★

Swag: In this two player game you are out to steal diamonds before your opponent gets them. You must avoid the droids, although you can convert them to your side by shooting them or moving onto a temporary safe zone. Shooting at the police gives points to your opponent and causes the car to chase you. (Micropower)

★ ★ ★

European Knowledge: Put your knowledge of Europe to the test by answering the multiple choice questions. These cover population, currency, language, famous people, and large towns. The program works against the clock and displays your final score as a percentage. (Micropower)

Datamaster: Takes input of numerical data and displays it in a variety of graphical forms. Particularly useful to managers and scientists for preparation of graphs, small businesses for the plotting of data, and teachers for demonstrating the different ways in which the same data can be represented. (Master)

★ ★ ★

Rhythm and Pitch: Designed to help students with some basic knowledge of rhythm and pitch to develop their ear for these basics of musical composition. Shows scores achieved and steers to correct level for practice. (Chalksoft)

★ ★ ★

Millionaire: In this management game you own a home computer and have written a small program. You must now invest your money to finance a project to sell it. All decisions are yours and involve sales, stock control, rates, and borrowing money. As your assets grow - so do the problems. (Incentive)

Belbase/Mailshot: A file and mailing system with options to create, add to, global or selective edit, delete, search, find/display/print, and label print. (Beltech)

★ ★ ★

Look Sharp: A two program educational package aimed at sharpening visual observation and memory recall. Each program consists of three separate games. Old MacDonald's Farm is aimed at 4 to 7-year-olds and features animals. Space Observer Recruitment Test tests quickness of hand and eye and is family entertainment for the over-7s. (Mirrorsoft)

★ ★ ★

Compact Accounting System: Written in Pascal and consisting of fully integrated sales, purchase and nominal ledgers, the system is designed to operate on a single disc drive but needs the 6502 second processor. It can handle 25 sales or purchase accounts with 50 transactions and 50 nominal accounts with 100 transactions. (Ormbeta)

From Page 51

protection.

You continue until you reach the year 1981 or you've run out of ospreys – horrible thought. You can then compare your efforts with the magnificent results the RSPB achieved in reality which are shown in the booklet.

It's a smashing program. The instructions are excellent. The graphics and animation are more than adequate and the whole package has the quality we've come to expect from Bourne.

Even the fact that it's educational – the well-illustrated booklet has a history of the osprey and a "Things to Do" – doesn't spoil the fun.

So if you haven't been to Loch Garten yet you can console yourself playing Osprey! until you get the chance. And even when you've felt the magic of the ospreys in real life, you'll still want to play it. Recommended.

Nigel Peters

Now birds replace the Invaders



IN *Birds of Prey* (Romik) you control a laser base at the bottom of the screen while overhead a rectangular formation of birds march from left to right and back again.

Sounds familiar? This is yet another variation on the Space Invaders theme although in this case the formation doesn't work down the screen until it squashes

you flat.

Instead birds peel off, drop down and belt round an oval track just over your head dropping a steady stream of bombs.

From time to time one dives down in an attempt to crash into you. If it succeeds you die, but unfortunately the bird doesn't, so when your next man pops onto the screen the same bird is already weaving down again to have a go.

Whatever difficulty level you choose to start – and there are 10 – each time you clear a screen you move up a level. This increases the maximum number of birds which can be in orbit at any one time and also the number of droppings (sorry, bombs).

You get a bonus life each time you succeed in clearing four screens.

Much thought has obviously gone into the graphics and sound and when things really hot up the screen has the appearance of a major fireworks display.

It is frustrating to have to specify the starting level and method of control (joysticks or not) at the start of every game.

The program will accept input from joysticks, but is designed for what I believe are known as Clare's joysticks. Mine are the BBC variety, and consequently work in reverse. The keyboard controls are also awkward – A for left, D for right and S for fire.

If you already have several versions of Space Invaders you probably won't want to rush out to buy this one. But if you are still looking for a game of this type *Birds of Prey* deserves serious consideration.

Michael Gilbert

Better than figures and numbers

DESIGNED as a learning and revision facility for O and A level maths and science, *Graph-easy* (HaMa Software) produces visual mathematics.

Anyone who finds difficulty understanding the language of equations can use the program to display a wide range of curves on cartesian coordinates, thus obtaining an easy means of viewing the changes which occur when equations are modified.

It gives an understanding and feel for mathematics which cannot be gained from lists of figures and numbers.

This type of visual reinforcement is invaluable and should help to remove some of the mystery and fear from mathematics, especially when using the program to set up graphical representations of real problems involving maxima, minima and intersection.

The program is easy to use and the screen display well set out. My only criticisms are that the axes are drawn too thick and that the border colours, though patriotic, are rather garish.

The equations of the curves are shown at the bottom of the screen and these can be altered from the keyboard. On entry into the program two curves are drawn and it is the equations of these curves which can be modified.

Full use is made of the user defined keys for implementing

various options and a bleep is sounded at the completion of each task.

The scales of the axes can be altered and equations can be differentiated and displayed.

Areas under curves can be found and displayed, a vertical cursor can be moved along the x axis to obtain x/y coordinates of a curve at any point.

There is also an option which enables data to be entered on the graph and displayed as a number of joined or discrete points. A best fit line can then be drawn through these points and the equation of this line is shown below the graph.

Despite a few minor errors the manual is thorough and easy to follow.

It starts by leading the user through a number of applications and includes quite a number of useful questions and answers aimed at teaching how best to use the program.

Despite the quality and usefulness of the program the price of £19.95 may deter private sales, but as it is an excellent teaching aid it should find its way into educational establishments.

John Daddy

Rescue the damsons(?) in distress

FOR all you chivalrous knights of the 21st century a new challenge has been launched. This time it is not some fair maiden that has to be rescued from a high tower but a basket of

Vectors gets content just right

EVERYTHING about *Vectors Maths Tutor* is right, except the price.

It is obvious from the start that this tape from Salamander Software covers in great detail the theory, application and testing of vector theory through a series of no less than 14 interlinked parts, each taking the subject a little further.

Vectors are vital to an understanding of applied mathematics at O and A-level, and anyone spending time and effort with this tape could hardly help

but improve his knowledge and understanding of the subject.

Each program takes the student at any chosen pace through a series of examples and illustrations, followed by an interactive set of the questions based on the work covered.

The screen display is clear and precise.

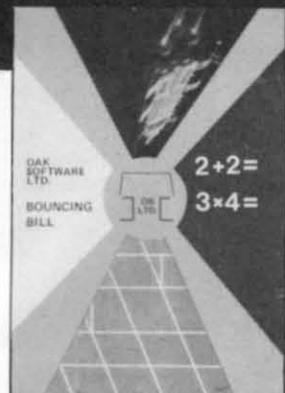
Beginning with definitions of vectors and the notations used throughout, the program moves crisply but evenly through vector matrices, parametric equation representation and three

dimensional work.

Parts made me think very hard, as I last studied A-level maths back in the pre-Pacman era, but students currently studying vectors at school or college could find this useful.

One most welcome feature is that Salamander give full clear instructions for the transferring of the programs to disc. With so many competitors trying to make transfer to disc well-nigh impossible, I must say I prefer this sensible approach.

Phil Taylor



damsons (in distress!)

This is the plot behind **Bouncing Bill** from Oak Software. You are given three lives to negotiate a conveyor belt system of moving walls by jumping through holes in them.

Your task is to reach the top of the screen and seize the basket of damsons suspended above, with points awarded for each wall passed.

Double points are lost for a retreat, accidental or otherwise.

Simple? It is at first, but the added bonus you earn begins to be paid for as ghosts haunt their way about the screen.

Slowly but surely things begin to hot up as red hot fireballs chase after you, adding a totally new meaning to the phrase "heat-seeking"!

The ominous message "...now it gets more difficult" at the successful completion of each sheet is no understatement.

But with three lives and the nerve to play on, quite a high score can be amassed.

Solitary balloons occasionally appear in among all the confusion and are well worth chasing for their bonus potential.

Falling through the holes or missing them when you jump poses quite a problem at times. Although erring is not lethal at first when you are just stunned, you can soon find your unconscious body falling further down as yet more holes open up beneath you.

If you don't recover in time you eventually hit the floor a fatal blow.

The graphics are quite good,

although for overall visual effect the screen is somewhat void of action in comparison with most arcade games.

Sound is less intense than in the majority of the more recent arcade hits, having more in common with the simple thud-thud of Space Invaders.

All in all this game is yet another victim of the times, being surpassed by the oncoming stampede of really high quality software.

It is much more suited to the patient player than to a whizz kid with fast reactions, since true success is more dependant on good strategy than speed.

Tarquin Thomas

The £200 prize looks safe...

I OFTEN feel quite guilty reviewing a game that I cannot master and **Gatecrasher** by Quicksilver is no exception. Mind you the only games I keep on playing are the ones I haven't mastered.

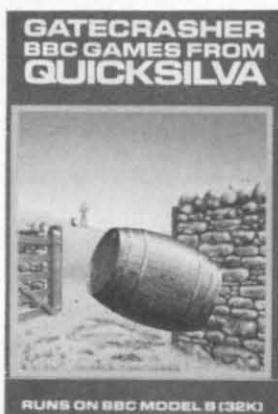
It is a game of skill and strategy – and quite a lot of luck. You control the lateral movement of a man above the entrances to a series of underground interconnecting tunnels.

After studying the maze you must select a particular chute down which to drop a barrel. The idea is to send the barrel into one of nine empty boxes at the base of the screen. Put one barrel in each box and you survive the screen. Put a barrel in a box which is already full and you lose its contents.

A few interesting little complications are built in. The direction in which a barrel moves is governed by a series of gates. Once a barrel is moving it continues until one of these gates changes its direction. As it does so the gate swivels ready to send the next barrel the opposite way.

If you decide that there is no path to the box of your choice, you have two options. The first is to scroll the screen either up or down, having the effect of changing the layout of the maze.

You can scroll six times in any one direction before the layout reverts to its original pattern.



Your alternative is to cause an earthquake. At the press of a key the whole screen shakes and a random number of gates change direction. This costs you one barrel and, as you only have 20 and score on the number of barrels not used, this option should not be taken lightly.

There are seven screens which increase in difficulty. Quicksilver appears confident that the game will pose problems as it has offered a £200 prize for anyone who can crack the hidden code on screen seven.

You will have your work cut out to even get there, never mind any secret code!

I found the game infuriatingly addictive and it tested my strategy to its limits. However I still only managed to reach screen 4.

The graphics are good, the sound is used to excellent effect and the preselected keys quite acceptable. It won't take the country by storm, but if I'd had to buy it I would have already had my money's worth.

Alan Mac

Help save those poor earthlings

A COLOURFUL test of your abilities, **Lunar Rescue** (Alligata) puts you in charge of returning your stranded fellow earthlings to the safety of your mothership.

On your command the hatch of the ship opens to begin your hazardous journey through a lethal asteroid storm to narrow landing pads below.

If you reach the ground successfully a grateful survivor races to safety and your ship automatically takes off again.

Here the danger really begins as the asteroids turn into enemy ships which must be blasted out of your path before you can



guide your rescue ship up to dock with the mothership.

If you miss the ship, your passenger plummets screaming to the ground. If you collide with it you lose one of your precious three rescue chances.

An addictive and entertaining version of a classic arcade idea. Good value.

Jane Jackson

Map Skills helps plug the geography gap

UNTIL recently there has been a dearth of readily available commercial geography software. But the situation is rapidly improving and **Introducing Map Skills I and II** (Cambridge University Press) attempt to present programs which can be used to improve mapwork concepts and skills.

Part I consists of two programs – Grid References and Scales. The former is intended as

an introduction to the use of four figure and six figure grid references.

A brief introductory section, using graphics, illustrates how they are used by different people. The remainder of the program is interactive with instruction and practice in the use of grid references.

A final section allows a

From Page 53

revision test, giving a score and indicating any weaknesses of the pupil in using grid references.

Scales is an instructional program using a map which can be displayed at one of four scales, or together superimposed so that the scales can be compared. The representative fraction is also displayed graphically.

Part II concentrates on the use of the compass and consists of three programs. Two are interactive ones providing instruction and revision on the use of compass points and bearings.

The third is a game for one or two players which makes use of compass directions or bearings to navigate a yacht around an oval course with the minimum number of goes and without hitting the bank.

The compass programs are the most difficult to use in the whole package, requiring careful teacher instruction and pupil attention to grasp the concepts.

The initial program is a useful introduction but has a number of defects. It is, for instance,

difficult to work out the bearings for certain compass points as the figures are plotted inside a circle and not alongside the compass direction.

This reduces the accuracy and makes it difficult for pupils to work out which bearing is being required.

Documentation is brief but adequate, giving an outline of possible classroom strategies for using the programs and a closer analysis of program structures, including screen displays.

Also included are instructions on actual use of the programs and worksheets which can be copied and used in the classroom.

The programs are probably most suitable for pupils of lower secondary age, though the readability of some of the text suggests that lower ability pupils would need considerable teacher assistance. I have tried the programs with a variety of age groups, including sixth form.

Overall the packages are useful and will temporarily plug the gap in the software market, but there is clearly room for improvement.

John Russell

Become a fearless mum...

IN Wallaby (Superior Software) you are a fearless mother marsupial. A bunch of vicious monkeys has caught your offspring and hauled it in a cage to the top of a tree.

So you must rescue the mite from their evil clutches.

To do this you climb a series of ladders and platforms, evading the apple cores hurled by monkeys trying to knock you out of the tree and kill you. Contact with either monkey or apple core means death.

In addition apples are being rained on you by a guard at the top of the tree.

Your secret weapon is a meaty straight jab with which you can wallop the monkeys and fend off the apple cores.

Around the screen is fruit which you can jump to and collect, so earning bonus points.

If you get to the top you start

another screen in which the monkeys take the cage containing your offspring further up the tree. Bonus points are awarded for the time remaining when you reach this point.

The sound is a little disappointing but this minor crib is offset by superb smooth animation. Great fun to play.

David Andrews

An artist born too late

ARTIST - Computer Aided Design (MRM Software), would have been a winner if produced two years ago. As it is, now that there are so many similar packages about it falls less than half way up the league table.

It has an excellent introduction sequence and the fact that the menu of possible drawing techniques is on continuous display at the top of the screen makes for easy switching between them.

All input is through the

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keyboard, mainly cursor controls and the < > keys.

The introduction cleverly describes all the drawing routines and commands, but a big niggle to me was the fact that I kept forgetting them.

A simple reminder reference card packed in with the cassette would help a lot.

Mode 2 allows the best selection of colours, but the fact that this is the lowest resolution screen unfortunately dictates the crudest style of drawing of which the BBC Micro is capable.

Here the pixel size obtrudes too much, circles and ellipses being obviously jagged. This screen really is not suitable for any but the most simplistic poster or infant storybook styles of drawing. Fine detail is out.

The system allows all the main routines such as line drawing, in a choice of four widths or open/filled triangles, squares, circles and ellipses.

All can be expanded or reduced from the initial size which appears at the cursor position when the appropriate menu selection is made.

As all the routines are machine code, I feel that a lot more could have been done to allow other, more sophisticated and perhaps innovative features to be added to compensate for the limitations of resolution.

Unfortunately because of the lack of memory the designer either provides low resolution and a range of colours or higher resolution and only two on-screen colours. Black and white aren't colours, despite what Acorn claims.

So although this package is quite a lot of fun to use, it isn't Computer Aided Design as the package proclaims.

Terry Hallard



Meet the 'hit first - ask questions later' PC Plod

WITH a swift kick you send the police traffic cone crashing through the bank window. Bags of money begin to fall from the broken window and drift gently down towards the river below...

In **Smash and Grab** (Superior Software) your job as the villain is to catch the falling loot before it reaches the river.

As is always the case in these ladders and levels games there is a snag. In this one it is in the shape of PC Plod, your local neighbourhood bobby.

This particular policeman would be more at home in the Sweeney than pounding the beat. Dirty Harry was modelled on this guy!

Should you be running along the level directly above him he is quite likely to leap upwards and thrust his truncheon through the floor into your nether regions.

When he is on the upper level his actions are even more dramatic as he falls flat on his face and batters you around the



head.

To complicate things further the occasional trio of flying traffic cones will wing their way along one of the levels in your direction. These can be dealt with by either getting out of the way, or by kicking each one in turn by pressing Return.

Although it may sound that

the odds aren't exactly in your favour you do have one trick up your sleeve. Should you kick one of the four police boxes when the light on top is flashing the traffic light at the top of the screen changes to red.

Immediately the bags of money stop falling, and any physical contact with the policeman will send him plunging to the water below. The traffic lights change to red and amber before the policeman becomes active again.

If you can collect eight bags of money you progress to the next screen. However as each missed bag of loot hits the water an alarm bell appears at the top of the screen. Five alarm bells and a life is lost.

The element of humour provided by the "hit first, ask questions later" policeman prevents the game from becoming just another "ladders and levels" clone.

Jon Revis

...and the hero called Sleepy Joe

IN **Nightmare Maze**, from MRM, the hero of the scenario, Sleepy Joe, must make his way around the maze collecting the eight keys required to open the Dark Door of Deeper Sleep and progress to the next level.

Unfortunately for Joe he is not the only occupant of the maze. The pathways are strewn with Springy Thingies which bounce around the maze emitting an irritatingly loud "boing-ing" noise.

There is no fear of Joe falling asleep in this game! But the sound can be turned off before starting the game.

Occasionally a cup of black coffee will appear in random positions around the maze. Touch the coffee and the bouncing beasts will disappear for a short time allowing Joe to collect his keys unhindered.

This facility is essential as it is infuriatingly difficult to collect all the keys within the time limit without having made the baddies



disappear at some stage.

One slightly irritating thing is that when a life is lost the keys already collected go too, so you must start again with eight keys to collect.

As you progress through the screens the complexity of the maze increases and the Springy Thingies are replaced by another

bevy of bouncing baddies.

The graphics of this game are drawn using the characteristic MRM 3D shading effect, the floor of the maze is given depth and all moving characters a shadow.

But the high standard attained by the graphics isn't repeated when it comes to moving the characters.

Moving in a straight line causes no problem, but when Joe comes to a crossroad, usually with a Springy right on his tail, it is well nigh impossible to make a smooth sidestep up one of the adjoining pathways.

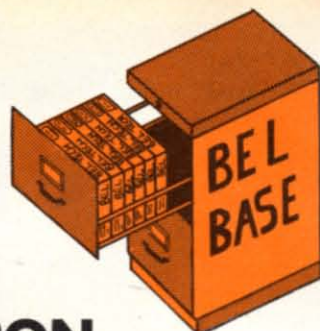
Unless Joe stands in the exact position at that junction there is no way he is allowed to change direction.

When releasing a new version of an old established theme such as this it has to be perfect. Unfortunately this was one nightmare that I could have easily slept through.

John Revis

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**FILES ARE COMPATIBLE WITH BEL GRAPH
ON DISC**

TECHNOMATIC

BBC Computer & Econet Referral Centre
17 Burnley Road, London NW10 4ED 01-208 1177

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A complete
Professional Word
Processing System

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A FREE
lightpen with
supporting
Software or
Acornsoft's Elite.
See Star Bargains

Xmas Special

ACORN COMPUTER SYSTEMS

BBC Model B Special Offer.....	£320 (a)
BBC Model B + Starter Pack.....	£348 (a)
BBC Model B + DFS.....	£409 (a)
BBC Model B + Econet.....	£389 (a)
BBC Model B + Econet + DFS.....	£450 (a)
BBC Dust Cover.....	£4 (d)
Pair of Joysticks.....	£14.50 (d)

UPGRADE KITS

A to B.....	£65 (d)	Installation.....	£20
ACORN DFS Kit.....	£95 (d)	Installation.....	£15
Econet Kit.....	£55 (d)	Installation.....	£25
Speech Kit.....	£47 (d)	Installation.....	£15

ECONET ACCESSORIES

Terminator (Two reqd per installation).....	£31 (c)	File Server Level II.....	£216 (c)
Clock with psu.....	£35 (c)	10 Station Lead Set.....	£26 (c)
Printer Server Rom.....	£42 (c)	Extra Econet cable.....	£1.50/m (d)
File Server Level I.....	£86 (c)	Econet User Guide.....	£10 (d)

ACORN BITSTICK

The renowned CAD package, providing unprecedented graphics facilities for the draftsman, engineer and graphics student — a 'word-processor' for graphics. Allows accurate drawing of lines, circles, curves etc — colours can be easily chosen from a palette. It is a FX80 dump routine easily loaded from a disc. The zoom facility allows a part of a drawing to be magnified up to 48 drawings on a disc. It is a library system for easy use allowing you to work on the edge of £328 (a)

STAR BARGAIN

Complete Word Processing System for only £1175 + VAT
Comprising: BBC Model B + DFS
2 x 400K 40/80T Dual Teac Disc Drive
(ideal for future upgrade for Z80)
Sanyo/Kaga Hi Res. Green Monitor
Juki 6100 Daisywheel Printer
Acorn 'View' Word Processor
Juki Printer Driver
All necessary Cables, Manuals etc.
and as an Xmas bonus for the kids!!
we are including a Light Pen with
Software! or Acornsoft's Elite
The choice is yours.
The 8000
UNIX
operating system, or set up a
network of upto 254 machines. All
these capabilities are available
NOW.



TORCH UNICOMM

For the Torch Z80 card user, comes a superb communications package. A BT approved modem using 1200/75 and 1200/1200 baud is supplied complete with BBC RS232 cable. Three superb software packages in CP/M are supplied complete with BBC RS232 cable. Three superb software packages in CP/M are supplied — these clearly show that Torch are not new to the 'communications scene': UNIVIEW for PRESTEL type use, allowing saving of frames, downloading of files etc. UNITERM is a sophisticated terminal emulator. UNIMAIL is an amazing package specifically for TORCH users. Among other facilities, it allows messages and files to be accessed from distant machines — access to files can be controlled by hierarchical passwords. Hardware + software: £159(a)



A BBC Family System

ACORN Z80 2nd Processor

This processor converts your BBC into a complete business micro with all the computing power a professional would need. The system is CP/M based and is supplied with a very extensive software package. The package includes three office productivity programs, (memoplan, fileplan and graphplan), Systems generator program, three programming languages plus the ACCOUNTANT business program. Software is accompanied by extensive manuals that not only get you started but also answers your whys and hows.

All for only £399 (a) (incl VAT)

ACORN 6502 2nd Processor

This processor is designed for the serious computer user who wants to get even more out of his computer. This processor provides increased memory — allowing up to 44K for Basic programs and up to 60K for assembly language programs, regardless of screen mode in use. (ideal for VIEW). An increase in speed means that programs run up to 50% faster. The second processor/BBC combination offer computing power comparable to systems costing twice as much. £175 (a)

TORCH GRADUATE SYSTEM

The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. (will run Lotus 123!). With 256K RAM and single/dual drives, it simply connects through the 1Mhz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the superb Xchange range of software, and includes a full-feature word processor, a financial planner, a database and a business graphics package — all 'linkable'.

G800/2: £945(a) Full Spec. & prices on application.

Z80 Card ZEP100 with PERFECT Software Packages

+ Z80 Basic.....	£299 (a)
Z80 Disc Pack ZDP240 with software as above.....	£699 (a)
20Mb Hard Disc + 1 x 400K Floppy Drive.....	£1,950 (a)
UNICOMM Communications Package + modem.....	£161 (a)
Unicom 68000, Unix OS/Z80B/256K, 20MB	
Hard Disc, 400K Floppy.....	£2995 (a)

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

KAGA TAXAN:

- * Epson Compatible Control codes
- * 80 or 156 Column
- * NEAR LETTER QUALITY Print using 23 x 18 matrix
- * Text Modes include Normal, Italic, Enlarged, Condensed, Super/Sub Script, Proportional
- * Dot Addressable graphics in various modes
- * 3K buffer which can also hold user defined characters
- * Extra socket for eeprom with custom made font
- * Friction & Tractor feed with built in paper roll holder

KP810 (80 column) £249 (a)

KP910 (156 column) £359 (a)

EPSON:

The industry standard printer offering the quality, reliability and versatility.

RX80T £215 (a) RX80FT £225 (a)

RX100 £345 (a) FX80 £318 (a) FX100 £435 (a)

DAISY WHEEL

BROTHER HR15: • 14 cps • 3K Buffer • Two colour printing • Proportion spacing • Underline • Bold & Shadow printing • super/Sub script + many other features.

BROTHER HR15 £349 (a)

JUKI 6100: • 15 cps • 2K Buffer • Switchable 10/12/15 cpi • Proportional printing • Linear Motor for max reliability.

JUKI 6100 £340 (a)

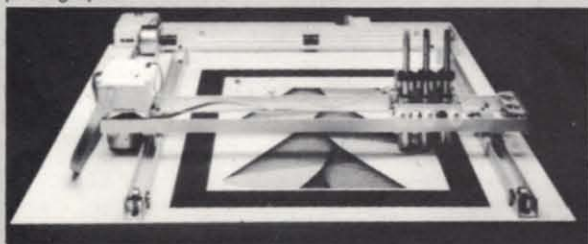
VIEW PRINTER DRIVER FOR FX80/KP810

This driver allows the use of all FX80s fonts to be used in text written using the VIEW rom. If user defined characters are held in the printer buffer they can also be used within the text. Manual and Disc includes examples of document layout and user definable characters. Supplied on 40 or 80 Track disc.....£7(d)

Printer Drivers for NEC PC8023, Brother HR15 and Juki 6100.....£7(d)

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scriber can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs.



Workstation Complete £490(a)

Basic Plotter £270(a)

Drill/Router Attachment £79(c)

Opto Sensor £72(c)

Power Supply: PS12V £42(c) PS24V £78(c)

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON

Paper Roll Holder £17(d) FX80 Tractor Attachment £37(c).

Interfaces: 8143 RS232 £28(c); 8148 RS232 + 2K £57(c);

8132 Apple II £60(c); 8165 IEEE + Cable £65(c).

Serial & Parallel Interfaces with larger buffers available.

Ribbons: RX/FX/MX80 £5.00(d); RX/FX/MX 100 £10(d);

FX80 Dustcover £4.50(d)

KAGA TAXAN: RS 232 Interface + 2K buffer £85(c); Ribbon KP810/910 £6(d)

JUKI: RS232 Interface £65(c); Spare Daisy Wheel £14(d); Ribbon £2.50(d);

Sheet Feeder £199(a); Tractor Feed Attach £99(a)

BROTHER HR15: Sheet Feeder £199(a); Ribbons Carbon or Nylon £4.50(a)

BBC Printer Lead: Parallel (42") £7(d); Serial £7(d);

Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):

2000 9.5" x 11" £13(b); 2000 14.5" x 11" £18.50(b)

Labels: 2-3/4" x 1-7/16" in quantities of 1000

Single Row: £5.25/1000 (d); Triple Row: £5.00/1000 (d)

PRINTER SHARER/BUFFER

A unique printer sharer/buffer that provides a simple way to improve the utilisation of the installed equipment by reducing the waiting time for printing documents. All but the smallest documents tie up the computer while being printed and the computer remains out of use until the printing is complete. This is more so in a network which does not have a dedicated computer for printer operation. This buffer/sharer would free the computers almost immediately for other uses and in many cases make the use of dedicated printer server machines unnecessary.

* Standard Centronics interface with 3 inputs.

* Each input port scanned every 5 secs to check for data. Switching between ports completely automatic.

* Data input rate 4800 bytes/sec

* LED Bargraph indicates percentage memory used.

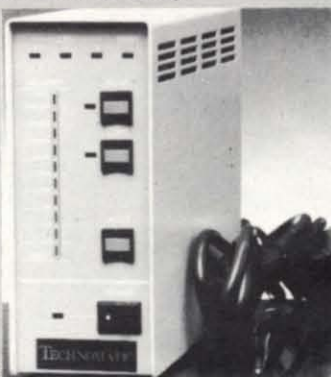
* COPY key allows current document to be reprinted.

* Internal check to prove the data integrity.

* PAUSE switch allows printing to be stopped temporarily to allow paper change, adjust form feed etc. or allows temporary storage for large number of small files which can all be printed together.

* RESET allows all buffer memory to be cleared without having to hard break on the computer.

* 64K buffer capacity. * Mains powered * Compact 7cm x 17cm x 24cm



TSB 64 Buffer/Sharer £245(a)

Cable Set £30

PRINTER & COMPUTER SHARERS

Three Computers to one printer (parallel) £65(b)

Six Computers to one printer (parallel) £129(b)

Cable Set for three way sharer (ea. 1m long) £25(c)

Cable Set for six way sharer (ea. 1m long) £45(c)

Above sharers can be powered from the BBC

External mains adaptor for Printer Sharer £7(d)

Computer Sharer to connect 2 printers to one Computer (parallel) £19.50(c)

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 x 192mm + menu area. Comes complete with a CAD package. £110(b).

01-208 1177

Please add carriage: (a) £8; (b) £2.50 (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

MONITORS

All monitors supplied with BBC lead

MICROVITEC 14" RGB

1431 Standard Resolution **£175(a)**

1451 Medium Resolution **£215(a)**

1441 Hi Resolution **£399(a)**

MICROVITEC 14" RGB with PAL & Audio

These monitors can receive TV programs thru a Video Recorder

1431AP Standard Resolution **£210(a)**

1451AP Medium Resolution **£310(a)**

MICROVITEC 20" RGB

2031 Std Res **£260(a)** 2040CS Hi Res **£570(a)**

KAGA TAXAN 12" RGB

VISION II Hi Res **£245(a)**

VISION III Super Hi Res **£345(a)**

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen **£99(a)**

KAGA KX1201G Hi Res 12" Etched Green Screen **£106(a)**

KAGA KX1202A Hi Res 12" Etched Amber Screen **£114(a)**

ZENITH 123 Hi Res 12" Green Screen **£70(a)**

ZENITH 122 Hi Res 12" Amber Screen **£70(a)**

Swivel Base for Kaga Monochrome fitted with Digital Clock **£21(c)**

Monitor Plinth for the BBC **£13.50(b)**

Double Tier Plinth for BBC and a flat dual drive **£19.50(b)**

BBC Leads Kaga RGB **£5(d)** Microvitec **£3.50(d)** Monochrome **£3.50(d)**

VIDEO DIGITISER

A high quality yet cost-effective unit offering uses for the scientific, educational and home user. Feeding in a video signal (this can be from a camera, VCR etc) will output to the BBC a high quality picture, with eight different grey levels. This picture can be stored on disc, manipulated or dumped to a printer. The friendly yet sophisticated menu driven software comes complete with an Epson printer dump. **£213(a)**.

SANYO DR101 DATA RECORDER

A high quality data recorder with switch selectable data/normal modes as well as cue/review and tape counter providing a reliable cassette storage system. DR101 with data lead **£30(c)** Extra Data Lead **£3(d)**

RH LIGHT PEN

A superior quality lightpen, features including: adjustable sensitivity, LED output to show data transmission, microswitch tip. Full software backup. **£39(c)**. This popular pen is well supported by useful graphics design and educational programs listed under software on the last page.

RAINBOW LIGHTPEN

Allow your child's creativity to run wild in colour, and develop their artistic potential — allows colour displays to be instantly drawn. Superb software includes facilities of saving and loading screens as well as an Epson screendump. **£10.35(c)**.

DISC DRIVES



TECHNOMATIC disc drives come fitted with high quality slimline Japanese mechanisms and represent the state of art in disc drive technology. They are built to highest standards and are all tested to their full performance capability before packaging. Single drives are offered with or without integral power supply whilst the dual drives are supplied with generously rated switch mode power supply. Attractively designed steel casings are painted in hard wearing BBC matching paint. All drives can operate in single and double density modes. Drives are supplied with cables, manual and formatting disc and are ready to be fitted to the computer.

Single Drives

1 x 100K 40T SS: TS55A **£100(a)** CS55A with psu **£125(a)**

1 x 400K 40/80T DS: TS55F **£160(a)** CS55F with psu **£179(a)**

1 x 100K 3" Hitachi 40T SS **£100(b)**

Dual Drives

2 x 100K 40T SS: TD55A with psu **£260(a)**

2 x 400K 40/80T DS: TD55F TEAC with psu **£380(a)**

2 x 400K 40/80T DS: TD55M Mitsubishi with psu **£365(a)**

DISC DRIVE MULTIPLEXER

A simple device that enables up to four computers to be connected to one single or dual drive. Ideal unit for installing in classrooms where networking is not planned or necessary or the costs have to be kept low or where software information is shared. Several of these units can be installed in series to connect more computers to access the same discs. Units supplied with 5' of cable per outlet as standard.

Write for full details.

TDM 4 Quad Unit (upto 4 computers) **£135(a)**

TDM 2 Dual Unit (2 computers) **£75(b)**

Note: All computers must be fitted with a DFS

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products

3M

Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD **£15(c)**

40 T DSDD **£18(c)**

80 T SSDD **£22(c)**

80 T DSDD **£24(c)**

DISC ACCESSORIES

Single Disc Cable **£6(d)** Dual Disc Cable **£8.50(d)**

10 Disc Library Case **£1.90(d)** 30 Disc Case **£8.00(c)**

Lockable Storage Boxes 30/40 Discs **£14(c)** 100 Discs **£19(c)**

The FLOPPICLENE disc head cleaning kit is the ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminate the risk of recontamination and abrasion of the sensitive disc heads and ensure continuously reliable data capture and transmission.

Floppiclene with 20 disposable cleaning discs. **£14.50(b)**.

COMMUNICATIONS

We offer the customer a choice of BT approved modems and suitable communication software, enabling the user to choose an ideal cost-effective system, perfectly suited to his individual needs. We stock modems for every requirement, whether it is for the business, or private user, whether you require access to a public database, bulletin boards or a mainframe, whether for local or international use.

MODEMS

TORCH UNICOMM See our section on Torch for further details.

ACORN PRESTEL The dedicated Prestel adaptor complete with integral, BT approved, auto-dial modem and software in ROM **POA**.

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as intercomputer communications. It conforms to CCITT V21 300/300 Baud standard. Battery/mains powered **£55(c)** BBC Lead **£3.50** External PSU **£8**.

WS2000 A world standard, BT approved, direct connect modem switchable between 75,300/300,600, 1200/75, 75/1200 baud. It is compatible with Bell 103/113/108, 202 and CCITT V21 & 23 standards and allows you to communicate with virtually any computer system in the world. This is the new generation modem that was chosen by the BBC to demonstrate a totally reliable USA-UK data link live on TV — it performed faultlessly in front of an audience of millions. This modem will cover Prestel, Micronet, Telecom Gold, Distel, Microweb, One-to-One, Bulletin Boards both in the UK and abroad, etc. etc. as well as user-to-user communication. It also has a rather useful facility of 'Reverse-Prestel' mode i.e. 75/1200 so that you can communicate with other users who only have a standard 1200/75 type modem. What possibly gives this modem its biggest advantage is its option of computer controlled switching between all modes of operation. In addition, separate auto-answer and auto-dial cards are available, giving this modem possibly the greatest potential of all. Mains powered. **£129(c)**. Data Cable **£7** Auto Dial Card **£30(d)** Auto Dial Cable **£4** Auto Answer Card **£30(d)**.



Unique menu driven software on disc to configure COMMSTAR to run correctly with the WS2000 modem. **£9.95(d)** (please specify 40 or 80 tracks)

TELEMOD-2 A BT approved modem complying with CCITT V23 1200/75 Duplex & 1200/1200 Half-Duplex standard, that allows communication with Viewdata services e.g. Prestel, Micronet etc., as well as using 1200 Baud for communicating with other computer users. Mains powered. **TELEMOD 2 62(b)** BBC Lead **£7.00**

TERMI This is a semi intelligent terminal emulator allowing the BBC to act as a dumb terminal, slave BBC graphics terminal, or VT52 terminal. The rates at which data is sent or received is easily set up with rates of up to 4800 Baud with 40/80 col. selectable. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Termi is not suitable for PRESTEL). **£28(d)**.

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eeprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£59(d)**.

COMMSTAR This intelligent communication facility is extremely easy to use yet very versatile. It features a terminal mode and a special PRESTEL mode. In Terminal mode, all input may be copied into a buffer in memory over which full control is provided. Controls of protocols is very simple and any type of file (not just ASCII) may be sent using XModem protocols. The Emulation mode may be used using a disc based emulation file to emulate virtually any terminal type within the capabilities of the BBC. In PRESTEL mode all normal Prestel features are available, including downloading of software, saving and retrieving of pages etc. etc. **£29(d)**.

TECHNOMATIC

All prices exclude VAT

EPROMER II

Our current version of the highly popular Eeprom programmer is now being enhanced to provide more and better facilities for easy programming by the user. The software will maintain its superiority over all currently available similar programmers. The range of eeproms handled has been widened to include the eeproms with lower programming voltage and eeproms which can be programmed using the fast algorithm. Control of all operations has been moved to the keyboard. The screen display has been improved to give more information. The screen editing facilities have also been modified to simplify the data entry.

Preliminary Information

- * The new Eeprom Programmer will now program 2516, 2532, 2564, 2716, 2732, 2764, 27128 and 27256 + 5V eeproms, and all but the 27256 in a single pass.
- * The programmer will be supplied with integral power supply, and interfaces with the BBC via the 1MHz bus. It is fully buffered and complies with Acorn protocols. There is no power drain from the computer.
- * No knobs or switches to fiddle with — total control from the keyboard.
- * Fully software driven with easy to understand instructions displayed on the screen.
- * Eeprom type selectable from the keyboard.
- * Selectable programming voltage 25/21/12.5V.
- * Defaults to normal programming with high speed algorithmic programming selectable, for a device with suitable capability.
- * Continuous screen display of eeprom type, option and address range selected.
- * Full screen editor with HEX or ASCII input. Constant display of logical eeprom address.
- * Can read, blank check, program and verify at any address/addresses on the eeprom.
- * Full Tape/Disk filing facility.
- * Several basic programs can be entered on a single eeprom and called up with individual name.

£102(b)

ATPL SIDEWIRE ROM EXPANSION BOARD

This is a well constructed expansion board that does not require soldering in its installation. It will give you an additional twelve sockets, with 16K battery backing option. This extra bit of parts includes a nickel-cadmium battery, allowing any software stored, to be retained for future use when the BBC is switched off. Several link-selectable options include the choice of type of Eeprom, and a 'write protect' for the RAM option. All the buses are fully buffered. **£39(d)** Battery Back-up Kit **£18**.

SMARTMOUTH

The Original 'Infinite Speech' Synthesiser — Still the Best!

A ready-built totally self-contained speech synthesiser unit, attractively packaged with built in speaker, Aux. output socket etc. Optimum sound quality is achieved due to a tailored frequency response audio stage. It allows the creation of any English word with both ease and simplicity, while, at the same time, being very economical in memory usage. You can easily add speech to most existing programs. Due to its remarkable infinite vocabulary, its uses spread throughout the whole spectrum of computer applications — these include educational, industrial, scientific, recreational etc. — simply plugs into the User Port. No ROMs are needed. Smartmouth is supplied with demo and development programs on cassette (easily transferred to disc) and full instructions. **£37(c)**.

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eeproms at a time with an average erasing time of about 20 mins. **£59(b)**.

UV1 as above but without the timer. **£47(b)**.

For Industrial Users, we offer UV140 & UV141 erasers with handling capacity of 14 eeproms. UV141 has a built in timer. Both offer full built in safety features UV140 **£61**; UV141 **£79(b)**.

'TIME-WARP' REAL-TIME CLOCK CALENDER

A low-cost compact unit that opens up the total range of Real-Time applications, and adds a new dimension to the personal computer. Though built to exacting professional standards, it is at a price previously unattainable, and brings it within reach of all BBC Computer owners. With its full integral battery backup, possibilities include an Electronic Diary, continuous display of 'on-screen' time and date information, automatic document dating, precise timing and control in scientific applications, recreational use in games etc. — its uses are endless and are simply limited by ones imagination. Simply plugs into the User Port — no ROMs needed. Extensive applications software supplied on cassette (easily transferred to disc) and full instruction manual. Please phone for details. **£29(c)**.



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Please add carriage: (a) £8; (b) £2.50 (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

ACORN IEEE INTERFACE

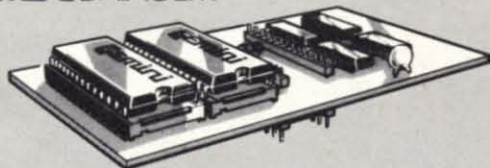
This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 separate IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. **£282(a)**

ACORN TELETXT INTERFACE

This interface allows the retrieval and storage of data transmitted by both BBC and IBA. There are currently many educational and other programs being transmitted, and this unit will allow their retrieval absolutely free. In 'Terminal' mode, the system receives and decodes pages from both Ceefax and Oracle. (These pages can be stored). In 'Telesoftware' mode, the system can load, run and execute programs that are transmitted. This unit gives you a professional teletext terminal at a cost effective price. **£195(b)**

DATABASE MANAGEMENT SYSTEM

Gemini DATAGEM



The Definitive Random Access, 24K ROM Based DATABASE MANAGEMENT SYSTEM.

Datagem is the first truly flexible database for the BBC Micro that can make your system really useful and efficient, saving you money in the long run. The system includes a carrier board containing two Eproms, demonstration applications disc in both 40/80T, professional documentation with quick reference card, and 'Trans' utility program. Features include: *almost unlimited file size (max 10MByte) *supports up to 4 drives *Max of 5000 records per file *max 6K record size *max of 62 fields *9 level hierarchical search system with facilities to store results of searches. Searches can be any one of the following: Search, Include, Exclude, Combine, Common or Difference *user defined variables *generates form letters from records. Please ask for leaflet. **£112(c)**

ACORNSOFT/MIRLE Business Software

A well designed, cost effective business system, having the advantage of being able to purchase packages individually, with the option of, possibly later, linking them with other packages. **INVOICING, ORDER PROCESSING, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, STOCK CONTROL, PURCHASING, MAILING SYSTEM. £22(d) each.**

SPECIAL CLEARANCE OFFER

Hell Driver;
Felix in the Factory;
Laser Commander;
Martian Attack;
Cybertron Mission;
Alien Destroyers;
Chess;
Escape from Moon
Base Alpha;

Swoop;
Alien Swirl;
Demon Decorator;
Android Attack;
Danger UXB;
Footer;
Moon Raider;
ZARM;
Eldorado Gold;

Galactic
Commander;
Where?;
Labyrinth of La
Coshe;
Chemistry;
Physics;
Constellation
Croaker.

Only **£2.50(d) each**

BBC FIRMWARE

VIEW Word Processor Rom on special offer at £48(c).

This is the new version V2.1. Advantages include being able to print straight from memory, as well as editing in any mode. Complete with comprehensive manuals to Acorns usual high standard.

WORDWISE One of the most popular word processors for general use **£34(d)**. Wordwise SpellCheck Disc — A must for any serious word processor user. Normal price **£16.50(d)**. If bought with Wordwise: No p&p and only **£14**.

ULTRACALC This new version of the successful spreadsheet program has several enhancements to increase its power and flexibility including: * Operation in any mode * Greater printer flexibility incl. control codes £ sign definition * runs as HICALC with 6502 second processor allowing 44K of space in any mode * Spooling as ASCII text files. These features are in addition to the existing powerful features such as handling of labels as well as numbers as values, allowing search by a meaningful name rather than just a number. Facilities and commands include: variable column width, sum, replicate, insert, delete, justify and most mathematical functions. You can create and manipulate pricelists, balance sheets, payroll, c/cflow order entry, small databases and scientific calculations. **£69(c)**

VIEWSHEET Ask for details **£52(c)**

BCPL A full implementation of the BCPL compiler language from Acornsoft. It consists of the BCPL language ROM and a disc containing the BCPL Compiler, a Screen Editor, a 6502 Assembler, other utilities and program development aids, and some examples of BCPL code. A comprehensive 450 page user guide is included. It can be used to develop games programs and commercial packages, to develop system software, to write control systems, and to produce programs which otherwise would need to be written in assembler. **£86(b)**

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IN my last series of articles I covered elementary graphic techniques in some detail.

Since then there has been much demand for a follow-up series so here it is – and we'll go straight onto GCOL3 and GCOL4, two commands that many find baffling.

To understand them properly we need to put them in the context of GCOL0, GCOL1 and GCOL2. Enter Program 1:

```
10 REM PROGRAM 1
20 MODE 4
30 REPEAT
40 GCOL0,1
50 PROCtriangle(0, 0, 1279, 1023)
60 delay$=GET$
70 UNTIL FALSE
80 DEF PROCtriangle(x%, y%, base%, height%)
90 MOVE x%, y% :MOVE x%+base%, y%
100 PLOT 85, x%+base%/2, y%+height%/2
110 ENDPROC
```

This has one procedure, PROCtriangle. We use it in a REPEAT... UNTIL loop (lines 30-70) to draw a triangle on the screen, as its name suggests.

Line 60 serves to prevent the loop being repeated until you press a key, and line 40 chooses the GCOL option you draw the rectangle with.

If you've run the program you'll have found that repeating the loop doesn't seem to have any effect.

This shouldn't surprise you – after all, with GCOL0,1 you are simply drawing the triangle in white on a black background, and in a fixed position. Repeating this will cause no visible change.

Of course we could use other GCOL options. For instance, GCOL2,1 will AND logical foreground colour one onto the screen. To see this, replace line 40 with:

```
40 GCOL2,1
```

and run the program.

Nothing appears on the screen no matter how many times you press the key.

When you think about it, this is correct. You are drawing the triangle, but as you are ANDing logical colour one onto background colour zero, you in fact plot colour zero since $1 \text{ AND } 0 = 0$. The next time through the loop you

are again ANDing 1 onto 0 and so on...

Another option is to use GCOL1,0 to OR our graphics onto the screen. Change line 40 to:

```
40 GCOL1,1
```

and run it. The triangle's back.

This is because we are ORing colour one onto background zero, which gives us colour one since $1 \text{ OR } 0 = 1$.

The next time through the loop we then OR colour one onto the colour one that is already there. Since $1 \text{ OR } 1 = 1$, the triangle is unchanged, and so on.

There are other GCOL options, however, that we have not covered.

For example, with GCOL3 we can EOR graphics onto the screen. Replace line 40 with:

```
40 GCOL3,1
```

and run the program. The triangle appears.

However pressing the key causes the triangle to disappear. Press once more and it reappears. Press again, it's gone and so on.

Initially you EOR colour one onto background zero. This plots the triangle in colour one, since $1 \text{ EOR } 0 = 1$.

The next time through the loop you EOR a triangle in colour one onto the triangle that is already there, also in colour one. These two now cancel each other out, since $1 \text{ EOR } 1 = 0$. Thus the

triangle disappears, being in the background colour.

Once more through the loop and you are EORing a triangle in colour one onto the triangle already present in colour zero. The triangle reappears, since $1 \text{ EOR } 0 = 1$.

I think you can see how it continues...

There's another option we haven't tried – GCOL4. Use this version of line 40 in Program 1:

```
40 GCOL4,1
```

Here the 4 following the GCOL causes the micro to *invert* whatever colour is on the screen at the points drawn, or to use the proper terminology, plotted.

To work out the inverse of a logical colour number simply subtract that number from the highest logical colour number available in that mode. Remembering that for a four colour mode the maximum is 3, not 4 – that is, one less than the number of colours available.

In other words, to find the inverse of logical colour number x , in a two colour mode the inverse is $1-x$, in a four colour mode the inverse is $3-x$, and in a 16 colour mode the inverse is $15-x$.

In our latest version of Program 1 we're in a two colour mode. When we clear the screen our background colour is zero, so since we're inverting with GCOL4 the colour in which our triangle

GCOL 3

GCOL 4

The baffling duo unmasked at last

appears in is $1 - 0 = 0$.

However when we press the space bar and plot it again the screen under the new triangle being plotted is in logical colour one, the colour of the previous triangle.

Now with GCOL4 it's the colour *under* the plotting that's important. Since it's in colour one we invert it, giving us a triangle drawn in $1 - 1 = 0$. As our background's already zero the triangle disappears.

The next time we draw it, however, we're plotting our new triangle onto an area that is all colour zero. As the inverse is $1 - 0 = 1$, the triangle reappears.

Don't let the last two variants of Program I convince you that GCOL3 and GCOL4 are the same thing – they're not, although they often seem uncannily alike.

```
10 REM PROGRAM II
20 MODE 5
30 REPEAT
40 GCOL3,1
50 PROCTriangle(0, 0, 1279, 1023)
60 delay$=GET$
70 UNTIL FALSE
80 DEF PROCTriangle(x%, y%, base%,
height%)
90 MOVE x%, y% : MOVE x%+base%, y%
100 PLOT 85, x%+base%/2, y%+height%
110 ENDPROC
```

Try Program II. This is another variant on Program I. All that's different is that it's in Mode 5, a four colour mode.

This time the triangle appears in red since $0 \text{ EOR } 1 = 1$, and in this mode logical colour one is red (assuming there's been no "VDU19ing"). The next time through it disappears, and so on as before.

If you now change line 40 to:

```
40 GCOL4,1
```

the triangle is white when it appears.

This is because it is plotting onto logical colour zero, the inverse of which – as we're in a four colour mode – is $3 - 0 = 3$, which in Mode 5 is initially white.

When we replot next time round the triangle goes since we're plotting onto an area of logical colour three, the inverse of which is zero ($3 - 3 = 0$). Round the loop once more, of course, and it's back.

Try adding the line:

```
25 GCOL0,130 : CLG
```

to give a yellow background. Can you see what's going on?

Two clues:

```
2 EOR 1 = 3
3 - 2 = 1
```

The point is that GCOL3 and GCOL4 aren't identical. They are similar though in this respect: do each of them twice and you're back to the beginning.

Just as in a double negative the two negatives cancel each other out, so if you EOR a number with another number twice, or invert a number twice, you get back to the original number.

That's why the triangles kept coming and going.

Let's look at EOR first. If we have 3 and we EOR it with 2 we get:

```
3 EOR 2 = 1
```

If we EOR the result with 2 yet again we obtain:

```
1 EOR 2 = 3
```

and our number – or colour – is back. It always works this way.

It might be easier to see in binary:

```
%11
EOR %10
%01
EOR %10
%11
```

Let's now have a look at inverting in a four colour mode.

Choose the number 2. Now the inverse of 2 is $3 - 2 = 1$. And if we then invert our answer (1) we obtain $3 - 1 = 2$, the number we started with.

We can use these techniques to give us a sneaky sort of animation.

Suppose we want to move a man across a background. We simply print him in the first position using GCOL3, or GCOL4.

To then wipe him out, we simply print him again in the same place, since EORing or inverting twice restores the status quo.

We then MOVE onto another position. We are, of course, under the influence of VDU 5, printing at the graphics cursor.

Program III does this in Mode 5.

Line 30 defines character 240 to be a little man, line 40 does the required

```
10 REM PROGRAM III
20 MODE 5
30 VDU 23,240,28,28,8,127,8,20,34,
65
40 VDU 5
50 GCOL 3,1
60 GCOL 0,129: CLG
70 REPEAT
80 FOR move%= 64 TO 1216 STEP 32
90 MOVE move%,512
100 VDU 240
110 FOR wait%=0 TO 500: NEXT wait%
120 MOVE move%,512
130 VDU 240
140 NEXT move%
150 UNTIL 0
```

VDU 5, line 50 causes us to PLOT in colour one under EOR and line 60 ensures a red background.

The animation is done by lines 80-140, a FOR...NEXT loop.

The REPEAT...UNTIL loop of lines 70, 150 simply keeps the animation cycling across the screen.

move% determines the X coordinate to print the man at. It increases each time through the loop.

Firstly – lines 90,100 – the loop prints the man at (move%, 512). It then pauses so you can see him (line 110).

Finally lines 120, 130 print him again at the same position.

Remember, though, that he has been EOR'd on. So the second printing on the same spot undoes the first and he disappears, ready to move on to a different position next time round the loop.

To show how vital this second printing is try leaving out line 130.

Now change line 50 of the original to:

```
50 GCOL4,1
```

so that we are inverting onto the screen.

This time when you run it, you see much the same thing happening, although the man will have changed colour. Do the sums and you'll see why.

Also, try using GCOL4 with numbers other than 1 – say 0, 2 and 3. As you'll see, there's no effect.

This is because the second figure is used in GCOL to specify the current foreground colour. However with GCOL4 the only colour taken into

GRAPHICS

From Page 65

account is that being plotted onto, so the second figure is irrelevant.

Don't leave it out though. The

```
10 REM PROGRAM IV
20 MODE 1
30 VDU 23;8202;0;0;0;
40 FOR offset%=0 TO 1024 STEP 16
50 GCOL3,RND(3)
60 MOVE offset%,0
70 DRAW 0, offset%
80 DRAW offset%,1023
90 DRAW 1023, offset%
100 DRAW offset%,0
110 NEXT offset%
120 wait$=BET$
```

machine expects it, even if it is a dummy!

One subject beloved of graphics programmers is curve-stitching. Personally, after the first dozen or so programs, I find them as boring as the real thing...

Still, they do tend to illustrate the uses of GCOL well, so I make no excuse for Program IV.

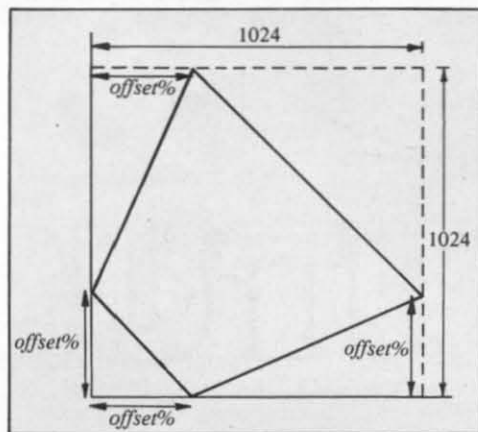


Figure 1:
Curve-stitch
quadrilateral

All I'm doing is repeatedly drawing a quadrilateral of the type shown in Figure 1, *offset%* increasing from 0 in steps of 16 (lines 40, 110).

Line 50 is the crux:

```
50 GCOL3, RND(3)
```

Here we are EORing random colours onto the screen, giving us rather attractive effects.

As an experiment, see what would

happen if you used GCOL4 instead as in:

```
50 GCOL4, RND(3)
```

Is that what you expected?

Finally, try GCOL0, 1 and 2 in line 50. Can you predict the results beforehand?

● That's enough for this month. Next time we'll look at some more practical uses of GCOL3 and GCOL4.



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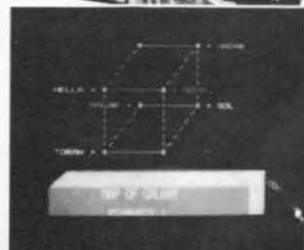
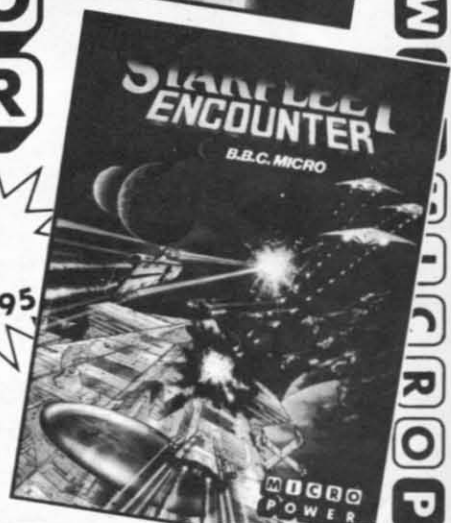
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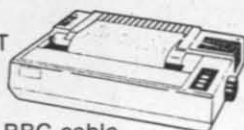
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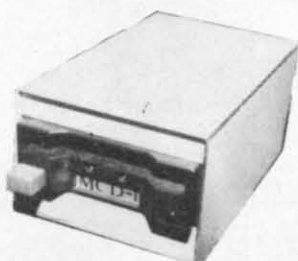
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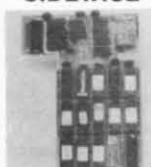
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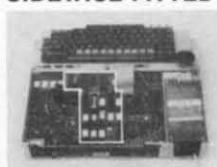


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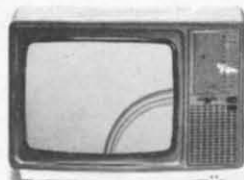
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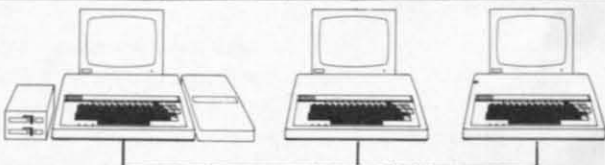
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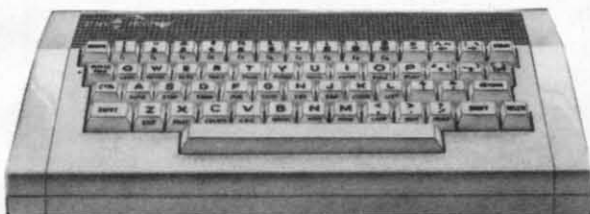
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Keep on that economic line between over and under feeding!
Save time recording milk yield and calculating feed amounts!
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Print out a recording sheet with cows in numerical order. Print out graphs or tables of individual cows or Monthly Groups showing serving and pregnancy details, illness record, Calving Index, weekly and running total Margin over Concentrate. See at a glance cows due for serving, pregnancy diagnosis and drying off. Keep track of

This exciting new ROM from Microtest will enable you to get all sorts of new characters and fonts from your BBC Computer. Once you have produced your masterpiece on the screen, all you have to do is use the inbuilt screen-dump utility to produce a hard copy onto paper.

Typing '*HELP FONTS' gives a list of available fonts and the blocks of characters which they replace.

Available fonts are:

- *Accents Accents and miscellaneous.
- *Block Small capitals.
- *Data Like the bottoms of cheques.
- *Greek It's all Greek to me too!
- *Joined Standard capitals with joined up lower case.
- *Maths A mix of until now unobtainable Mathematical symbols.
- *Miscellaneous A few oddities which often are very necessary.
- *Thick Thick text (for MODEs 0&3) to enhance 80 column mode.

Do not allow yourself to be lulled into a sense of security for it will be short lived.

Many have gone before only to swell the ranks of the damned. This is the latest adventure from the stables of Microtest and has been written with the acclaimed features of other adventures in mind eg save facility, quick response, simple but extensive commands, a mixture of logical and fiendish problems to solve.

Be warned this is an easy adventure to get into but devilishly difficult to end.

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MICROTEST FONT ROM

*Thin

Thin text (for MODEs 2&5) which makes modes 2 & 5 much more readable or perhaps "READABLE".

*MODE 8

Ten column multicolour, memory-miserly mode.

*Vertical

For labelling graphs.

*S DUMP

A dump facility which will produce a screen dump of any MODE from 0 to 8 (including a text only dump in MODE 7) on an Epson, Star, CTI CP80 or MT80.

The ROM uses absolutely NO user memory and can be used with word processors etc. as well as normal BASIC programs. The DUMP utility will produce positive or negative graphics and will also rotate the picture produced through 90° as well as being able to position the picture anywhere laterally across the sheet of paper.

£17.50 inc VAT (add 50p p&p)

New Issue Microtest Starstick & Joystick Package.

announcing the arrival of the new issue 2+ ROM.

Available now the NEW issue 2+ ROM Joystick comes in three forms:

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OPTION 3 The Starstick ROM and Patch Lead (choose your own Atari/Spectrum style joystick)

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OPTION 4 Send your old version STARSTICK ROM back to us for reprogramming to issue 2+

Price £3.50 + £0.50 P&P.

VI.4 STARSTICK was 4K the new version has been squashed into 8K.

The NEW ISSUE ROM is compatible with latest ACORN SOFTWARE programs as well as REPLICA II.

As with the VI.4 issue of ROM you can at last connect good "self centring", "rapid action" joysticks to the BBC Computer via the user port. (Model A owners please note that you do not need the analogue interface fitted to your computer but you will need the user port and IC76).

Pressing any combination of the BREAK key does not effect the STARSTICK software and now by pressing TAB-BREAK REPLICA II is auto booted and is compatible with the STARSTICK ROM V2+.

The software patch provided in the ROM monitors O.S. calls and patches the Joystick to the Games programs, and so will work with most games programs even programs not meant to function with Joysticks (except those using illegal direct memory addressing).

to games.
ROM manager, disallows troublesome ROMs.

- *KILL replace up to two joysticks.
- *DOUBLE TAB-BREAK Auto boots REPLICA II.
- *PAUSE define key to freeze game.
- *NPAUSE disallow *PAUSE.
- *NAME predefined key protocols.
- *HELP KEYS display current key protocols.
- *REPEAT enables ROM based auto repeat.
- *NREPEAT disallows *REPEAT.

Should a contention state occur when two roms or more try to use the same *command prefixing any of the above with M will help solve the problem.

The new command summary and description is:-

- *STICK enables the ROM.
- *NSTICK disables the ROM.
- *SETSTICK program joystick.
- *KSAVE save protocols set by *SETSTICK.
- *KLOAD load protocols saved by *KSAVE.
- *MAP remap current keyboard definitions.
- *CLEVER intelligent loading of software (ensuring ACORN compatibility).
- *PLONK relocate area of work memory used.
- *PROP1 proportional joystick emulator 1.
- *PROP2 proportional joystick emulator 2.
- *ANA patches joysticks via the analogue port



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Large picture shows BBC Computer System and a Quikshot II Joystick. Small inset just a few of the joysticks that will work with the patch lead. Screenshot by kind permission of SUPERIOR SOFTWARE

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VISA



COMPUTER Concepts have added to their extensive ROM software for the BBC Micro with one that makes it much easier to control an Epson FX or MX printer.

Called the Printmaster, it fits into one of the sideways ROM sockets. It contains 23 new commands for the operating system – probably the most useful being *GDUMP which will dump the contents of the screen to the printer in any mode, including Mode 7 with all its graphics properly shown.

*GDUMP without parameters will print the screen sideways on the paper, almost filling the width.

The vertical diameter of a circle printed on the micro's screen is 1.6 per cent greater than its horizontal diameter. The corresponding figure for the same circle dumped to an Epson FX80 is 7.9 per cent – hardly noticeable to the eye.

*GDUMP can also take up to five optional parameters. The first (with values 0 to 3) sets the orientation to left or right (0, the default); or rotated successfully through 90 degrees in three further steps (1 to 3).

The second (0 to 3) chooses between an inverse multi-tone dump (0, the default), inverse two-tone, and the above two options repeated but not inverse.

Inverse means that lighter colours come out darker and vice-versa.

The shades used to represent colours are good, although the difference between yellow and cyan in an inverse dump is small. The quality of the dumped image is very good.

The third and fourth parameters specify the size of the dump (for all except Mode 7) which can be taller, shorter or wider in all modes, and narrower in all but Mode 0.

The fundamental arithmetic of screen pixels and printer dots limits the size of steps available when changing size.

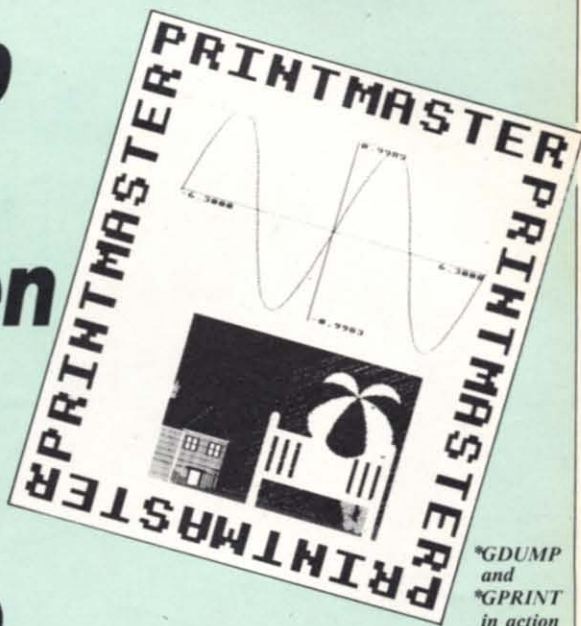
The fifth parameter sets the left margin in 20ths of an inch. A full sized (across the width) full screen takes 258 seconds to dump in Mode 0; 200 in Modes 1 and 4; 158 in Mode 2 and 5; and 93 in Mode 7.

The size and shape of the window to be dumped can be set by *WINDOW.

When executed, a box appears on the screen, the four sides of which can be moved by the cursor keys. Only the image in the window will be dumped.

Alternatively, the window can be set

Dump your screen in any mode with Printmaster



*GDUMP
and
*GPRINT
in action

A useful ROM reviewed
by NORMAN KIRKBY

by the usual VDU 24 statement. The image in the windowed area can be enlarged by the third and fourth parameters of *GDUMP as described above.

It is simplicity itself to use these commands. Use them either from the keyboard, or simply insert them in your Basic program – or machine code program too, I suppose – where the screen is in the state for dumping.

*TDUMP is similar to *GDUMP except it dumps only the text on the screen, including user defined characters, and it cannot enlarge or reduce the image nor re-orientate it – but it is faster.

*GPRINT has up to six parameters and will dump a string in multi-sized characters in any of eight orientations. For example across the page normally, across the page and upside down, across the page and each letter facing right, ditto with each facing left, and similar with vertically down.

It will also dump in any of seven shades or seven inverse shades. The left margin can be set.

*FDUMP transfers an Ascii file (or

*SPOOLED file) to the printer directly, allowing the micro to continue more or less normally with other tasks. This saves time.

Twelve * commands make it easy to set such things as italics (not for MX80), underline, linespace, margin, skip over perforation and international character set.

*DEFINE designs or edits user defined characters using a grid, the cursor keys for movement, and Return to fill a pixel. *USAVE and *ULOAD save and load the definitions for user characters.

The 32 page manual is good, and *HELP will list all the commands on the screen with their syntaxes. Twelve error messages are provided.

To avoid the commands clashing with other ROMs, each can be prefixed with a "C" if desired. More software houses are now doing this.

This is a very useful ROM and I can thoroughly recommend it at £33.35. It is up to the high standard expected of Computer Concept's products. Similar ROMs for other printers are planned.



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WHEN you run Medit, the Micro User memory editor, the first thing it asks for is a base address.

This is the location of the first byte you want to edit, and appears in the top left corner of the screen. The screen format is identical to that used by the *DUMP utility in the DFS:

```
AAAA HH HH HH HH HH HH HH HH CCCCCCCC
```

AAAA is the address of the first location on the line, the HHs are the hexadecimal values of the contents of eight bytes from AAAA onwards, and the Cs are the character representations of these bytes.

Characters not in the range 32-126 are printed as periods. This format is repeated down the screen, the address AAAA being incremented on each line.

The difference between Medit's format and *DUMP's is that Medit will use as much of the screen width as the current text window allows, within the limitation that the number of bytes displayed on a line is a power of two.

So in an 80 column mode 16 bytes are displayed on each line.

In the 40 column modes eight bytes are displayed and in the 20 column modes, two bytes per line are shown, although this is not very useful.

Since Medit reads the text window size, it can cope with windows of any sensible height and width.

Medit uses the cursor control keys and Shift. In addition, any character that can be obtained from the keyboard may be used to insert text into memory. Hexadecimal numbers may be typed as well.

Medit starts off in hex mode which means that it will try to interpret characters typed in as hex digits. The location currently being affected is indicated by the cursor position.

So to change the contents of that location to, say, &98, simply type 9 and then 8. The value at the cursor will change to reflect this - unless you are editing ROM - as will the Ascii version on the right hand side.

To alter the location being affected the arrow keys are used. Up and down arrows move the cursor by one line, scrolling when the top or bottom of the screen is reached.

Shift plus the up or down arrow move by one screenful without changing the cursor position on the screen.

Left and right arrows move the cursor to the previous or next byte, wrapping round at the end of the line. Shift plus the left or right arrow move

medit

A useful memory editor - with a difference

the cursor to the start and end of the current line.

To switch between hex entry and Ascii entry modes you use Copy. Pressing it once will change from hex to Ascii or vice versa and pressing it again will change back.

Only keys 0-9 and A-F are used in hex mode. In Ascii mode any key code

By
PETER JOHNSON

except those produced by the cursor keys can be typed. In addition, an automatic cursor-right is done in Ascii mode after each character is entered.

A word of caution - don't use Medit to change itself when it is running, as this tends to make it crash!

Program Structure

- 1080 Sets up the error routine to restore the cursor key mode and print the error message.
- 1100 Calls the set-up routine.
- 1120 Main loop.
- 1130 Positions the cursor, depending on hex or Ascii mode.
- 1140 Gets a key from the user.
- 1150 If it's a cursor key, call PROCcursor to deal with it.
- 1160 Otherwise try to interpret it as a hex or Ascii character, depending on the input mode.
- 1170 Do it all again.
- 1190 PROCinit, the set-up routine.
- 1230 Gets the base address to edit.
- 1240 Puts an & at the start if the user didn't.
- 1250 Sets base% to the base address specified.
- 1270 Assigns some constants.
- 1310 Calls PROCass to assemble the print line machine code.
- 1330 Gets the width of the text window from the VDU vars.

- 1340 Gets the height of the window from the VDU vars.
- 1360 Finds the nearest power of two width that will fit in the window.
- 1370 If the window is too small, end.
- 1380 Tells the machine code variable _width about the width.
- 1390 Finds the offset - the start of the Ascii part of the display.
- 1410 Makes the cursor keys produces code &87-&8B (see User Guide).
- 1420 Assigns some more constants.
- 1430 Some VDU codes.
- 1440 The negative INKEY code for shift.
- 1460 Starts off in hex input mode.
- 1470 Sets initial coordinate to 0,0.
- 1480 Clears the text window.
- 1490 Sets up the initial screen.
- 1520 FNvduVar returns a VDU variable using OSBYTE 160.
- 1570 PROCinitScreen prints height% rows of dump from the top
- 1640 by calling printRow for each line.
- 1650 Don't do a newline on the bottom line!
- 1720 PROCcursor just changes mode if Copy was pressed.
- 1740 Otherwise check Shift for large cursor movements.
- 1750 Jumps to the left, right, down or up routine.
- 1780 Moves cursor left, wrapping round at character zero, or just makes x% zero if Shift left was pressed.
- 1860 Moves cursor right, wrapping round at width%, or just makes x% width%-1 if Shift right was pressed.
- 1820 Moves cursor down, by a whole page if Shift is pressed too, or by a single line. Scrolls

From Page 73

1910 screen up if we're at height%-1. Moves cursor up, by a whole page if Shift is pressed too, or by a single line. Scrolls if we're at line zero already.

1960 PROCheXInput. If in% is a hex digit, updates the current location and screen, else ignores it.
2060 PROCasciInput. Pokes in% into the current location and does a cursor right to get onto the next position. Updates the

screen.

2140 PROCass. Assembles the code to produce a line of hex at printRow.
2160 _addr is the address of the line, _width is the number of bytes. onwards - see comments in the program.
2230

Variables

base% Base address shown at the top left of the screen.
height% Number of rows on the screen minus one.
hex% Flag which is true during hex input mode and false for Ascii.
in% Ascii code of the last character typed.
offset% Displacement to the Ascii part of the dump.
width% Number of columns on the screen.
s% Flag which is true for Shift-type cursor movements.
v% Parameter to FNvduvar, giving the variable to read.
x% X coordinate of the cursor (0 is the first byte on a line)
y% Y coordinate of the cursor (0 is the top line).
_addr Address where the base row address is stored for the machine code.
_width Address where the display width is stored for the machine code.

Constants

bottomRow = &309 VDU variable giving text window bottom edge.
copyCode% = &87 The code produced by COPY after *FX4,1
home% = 30 VDU code homing the cursor to the top left.
leftCol = &308 VDU variable giving text window left edge.
osbyte = &FFF4 Address of the MOS OSBYTE routine.
readVdu = &A0 OSBYTE number for "Read VDU variables".
rightCol = &30A VDU variable giving text window right edge.
shiftKey% = 1 Negative INKEY code of the SHIFT key.
tabXY% = 31 VDU code for PRINT TAB(X,Y).
topRow = &30B VDU variable giving text window top edge.
upCode% = &8B Code produced by up arrow after *FX4,1.
vt% = 11 VDU code moving the cursor right one space.

Medit listing

```

1000 REM Memory editor for the BBC M
icro
1010 REM Asks for a start address an
d then
1020 REM displays that area in memor
y in DFS
1030 REM 'dump' format. This may be
edited
1040 REM in hex or ASCII using the c
ursor keys
1050 REM to move around and COPY to
switch
1060 REM between hex and ASCII modes

1070
1080 ON ERROR PROCerror
1090
1100 PROCinit
1110
1120 REPEAT
1130 IF hex% THEN VDU tabXY%,3*x%+
6,y% ELSE VDU tabXY%,offset%+x%,y%
1140 in%=GET
1150 IF in%<copyCode% AND in%<up
Code% THEN PROCcursor: GOTO 1170
1160 IF hex% THEN PROCheXInput ELS
E PROCasciInput
1170 UNTIL FALSE

1180
1190 DEF PROCinit
1200 REM Find height% (max y%+1), w
idth% (max x%+1) etc
1210 REM and set-up the screen for
editing
1220
1230 INPUT "Address &"base$
1240 IF LEFT$(base$,1)="/" THEN bas
e$=MID$(base$,2)
1250 base%=EVAL("&"+"base$") AND &FFF
F
1260
1270 osbyte=&FFF4: readVdu=&A0
1280 leftCol=&308: bottomRow=&309
1290 rightCol=&30A: topRow=&30B
1300
1310 PROCass
1320
1330 width%=FNvduVar(rightCol)-FNvd
uVar(leftCol)
1340 height%=FNvduVar(bottomRow)-FN
vduVar(topRow)+1
1350
1360 width%=(width%-5) DIV 4
1370 IF width%<1 THEN END ELSE widt
h%=2^INT(LN(width%)/LN(2))
1380 ?_width=width%

1390 offset%=3*width%+5
1400
1410 *FX4,1
1420 copyCode%=&87: upCode%=&8B
1430 home%=30: vt%=11
1440 shiftKey%=1
1450
1460 hex%=TRUE: tabXY%=31
1470 x%=0: y%=0
1480 CLS
1490 PROCinitScreen
1500 ENDPROC
1510
1520 DEF FNvduVar(v%)
1530 REM Read the v%th VDU variabl
e
1540 AX=readVdu: XX=v%
1550 =USR osbyte DIV &100 AND &FF
1560
1570 DEF PROCinitScreen
1580 REM Get the screen into its i
nitial state
1590 REM ie. full of hex and ASCII
1600 LOCAL y%
1610 VDU home%
1620 FOR y%=0 TO height%-1

```


A STAR IS BORN



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Imagine Commstar

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How many times have you wanted to get a copy of a program to a friend or a business colleague quickly? With Commstar you can transfer a file of ANY type, between two BBC's (which may be thousands of miles apart), in the space of a phone call. It really is that simple!

Commstar is 'intelligent'. It offers many advanced features to ensure simple and effective communication with the remote system. Consider the following features:

Prestel Mode

Prestel mode features full colour Prestel graphics including double height and flashing characters. Full Telesoftware capability is offered allowing the many free programs offered by Micronet 800 to be downloaded into your computer. Pages of particular interest may be 'marked' for later retrieval and display. Page images may be copied and saved to a file on the current filing system.

Terminal Mode

In terminal mode all input may be copied into a buffer in memory or spooled directly on to disc. Full control over buffered data is provided allowing it to be listed to screen or printer, sent to the RS423, saved to or loaded from the current filing system (including TAPE). Commstar allows full configuration and easy control over the protocols used. Send and receive baud rates, word length, parity and number of stop bits are selected from a simple table of options.

When in chat mode (80 or 40 column), characters transmitted by the host will be displayed on the BBC screen and characters typed on the BBC will be sent to the host. Commstar allows ANY type of file (not just ASCII) to be transferred 'safely' using XMODEM protocols. In fact, four individual methods of transmission are provided for within Commstar giving great flexibility.

Using a disk based 'emulation file' Commstar can be configured to emulate virtually any terminal type including VT100, within the capabilities of the BBC. In addition to the above, most MOS commands can be executed from within Commstar, errors are trapped by Commstar's own error-handling routines and an optional elapsed time clock may be displayed. Data filter, Local Echo, Auto-line-feed, printer on/off and XON/XOFF protocols may be toggled in or out by a single key press, extensive use being made of the function keys. Finally, Commstar may be fitted into any of the sideways ROM sockets and is provided with a comprehensive manual.

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A revolutionary new approach to program development aids.

Toolstar is a powerful new utility Rom that will open up a whole new world for BBC micro users. Toolstar adopts a revolutionary new approach to program development aids. It has been designed specifically to assist both Basic and Machine-code programmers by providing an integrated set of powerful building blocks which rapidly become an indispensable complement to the built-in facilities of your BBC micro.

This package contains the Toolstar firmware in Eprom and a very comprehensive manual (over 150 pages), containing many examples and illustrations to help you make the best use of Toolstar's exciting capabilities.

Toolstar sheds new light on your BBC micro

Toolstar, being Eprom-based will be permanently resident in your computer allowing all of its commands to be immediately available. It is 'transparent' to both the user and the operating system; once a command has been executed, control is returned to Basic, or whichever ROM had control prior to the command. Full error handling has been incorporated and for new users there are full help menus describing each command and its syntax.

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Within Toolstar there are 22 commands, 8 of which operate between PAGE and TOP ie. on the current Basic program or Basic programming environment. These commands obey standard Basic command syntax rules.

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Toolstar allows the operations of Formatting, Verifying, reading or writing a disc sector to be carried out very simply from Basic i.e. all the necessary building blocks required to develop a comprehensive set of disc utilities, simply and effectively.

Lost your memory? - No more amnesia with Toolstar!

In addition to the commands described above there are 9 commands which operate on the whole of the BBC's memory and are designed to complement the BBC's built-in assembler. These include a full feature disassembler and memory dump, each with forward and reverse scrolling.

If this is not enough Toolstar can be Extended!

There are three help menus on Toolstar which may be obtained by typing HELP TOOLS, *HELP MCODE or *HELP EXTEND. The third option menu will initially display the following:

*HELP EXTEND

EXTEND <RAM add>

i.e. typing 'EXTEND <address>' will allow the user to extend the facilities of Toolstar with routines which are supplied by himself. The manual describes fully how this operation is carried out and illustrates it with several examples.

In the future such utilities will be made available on disc and cassette from Pace, thus allowing a comprehensive library of utility programs to be built-up.

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Medit listing

From Page 74

```

1630 !_addr=baseX+widthX*yX
1640 CALL printRow
1650 IF yX<heightX-1:PRINT
1660 NEXT yX
1670 ENDPROC
1680
1690 DEF PROCcursor
1700 REM Does and up, down, left
or right
1710 REM or switches between hex
and ASCII input
1720 IF inX=copyCodeX THEN hexX=NO
T hexX:ENDPROC
1730
1740 sX=INKEY-shiftKeyX
1750 ON inX-copyCodeX GOSUB 1780,1
820,1860,1910
1760 ENDPROC
1770
1780 REM Cursor left
1790 IF sX THEN xX=0 ELSE IF xX>0
THEN xX=xX-1 ELSE xX=widthX-1:GOSUB 1
910
1800 RETURN
1810
1820 REM Cursor right
1830 IF sX THEN xX=widthX-1 ELSE I
F xX<widthX-1 THEN xX=xX+1 ELSE xX=0:
GOSUB 1860
1840 RETURN
1850
1860 REM Cursor down
1870 IF sX THEN baseX=baseX+widthX
*heightX:PROCinitScreen:RETURN
1880 IF yX<heightX-1 THEN yX=yX+1
ELSE PRINT:baseX=baseX+widthX:!_addr=
baseX+widthX*yX:CALL printRow
1890 RETURN
1900
1910 REM Cursor up
1920 IF sX THEN baseX=baseX-widthX
*heightX:PROCinitScreen:RETURN
1930 IF yX>0 THEN yX=yX-1 ELSE VDU
vtX:baseX=baseX-widthX:!_addr=baseX+
widthX*yX:CALL printRow
1940 RETURN
1950
1960 DEF PROChexInput
1970 REM Treat inX as a hex digit
if possible
1980 REM and updates the current
location accordingly
1990 IF inX<ASC"0" OR inX<ASC"F" T
HEN ENDPROC
2000 IF inX<ASC"9" AND inX<ASC"A"
THEN ENDPROC

```

```

2010 IF inX<ASC"A" THEN inX=10+in
X-ASC"A" ELSE inX=inX-ASC"0"
2020 baseX?(yX+widthX*xX)=&10*base
X?(yX+widthX*xX)+inX
2030 !_addr=baseX+widthX*yX:CALL p
rintRow
2040 ENDPROC
2050
2060 DEF PROCasciiInput
2070 REM Treat inX as a character
and updates
2080 REM the current location acc
ordingly
2090 baseX?(yX+widthX*xX)=inX
2100 !_addr=baseX+widthX*yX:CALL p
rintRow
2110 sX=0:GOSUB 1820
2120 ENDPROC
2130
2140 DEF PROCass
2150 REM Machine code to do one r
ow of the dump
2160 _addr=&71:_width=&70
2170 oswrch=&FFEE:cursorPos=&86
2180 tabXY=31
2190 DIM code 100
2200 FOR opt=0 TO 2 STEP 2
2210 PZ=code
2220 [ opt opt
2230 .printRow
2240 lda fcursorPos \ Move 0,VPD
S
2250 jsr osbyte
2260 lda ftabXY
2270 jsr oswrch
2280 lda f0
2290 jsr oswrch
2300 tya
2310 jsr oswrch
2320 lda _addr+i \ Print the
address
2330 jsr outHex
2340 lda _addr
2350 jsr outHexSpC \ Followed b
y a space
2360 ldy f0 \ Do _width
bytes
2370 .loop1
2380 lda (_addr),Y
2390 jsr outHexSpC \ First the
hex
2400 iny
2410 cpy _width \ Finished?
2420 bcc loop1
2430
2440 ldy f0 \ Now the AS
CII part
2450 .loop2
2460 lda (_addr),Y

```

```

2470 jsr outch \ Print "."
for non-ascii
2480 iny
2490 cpy _width \ Finished?
2500 bcc loop2
2510
2520 rts
2530
2540 .outHexSpC
2550 jsr outHex \ Print Acc
in hex, then space
2560 lda fASC" "
2570 jmp oswrch
2580
2590 .outHex
2600 pha \ First uppe
r nibble
2610 lsr A
2620 lsr A
2630 lsr A
2640 lsr A
2650 jsr outNibble
2660 pla \ Then lower
nibble
2670 and f&OF
2680
2690 .outNibble
2700 cmp f10 \ Letter?
2710 bcs letter
2720 ora fASC"0" \ Make into
ASCII
2730 jmp oswrch
2740 .letter
2750 adc fASC"A"-11 \ Make into
ASCII
2760 jmp oswrch
2770
2780 .outch
2790 cmp fASC" " \ Print "."
for non-ascii
2800 bcc outDot
2810 cmp fASC""+1
2820 bcc printIt
2830 .outDot
2840 lda fASC"."
2850 .printIt
2860 jmp oswrch
2870 ]
2880 NEXT
2890 ENDPROC
2900
2910 DEF PROCerror
2920 *FX4
2930 REPORT:PRINT" at line ";ERL
2940 END

```

This listing is included in this month's cassette tape offer. See order form on Page 237.

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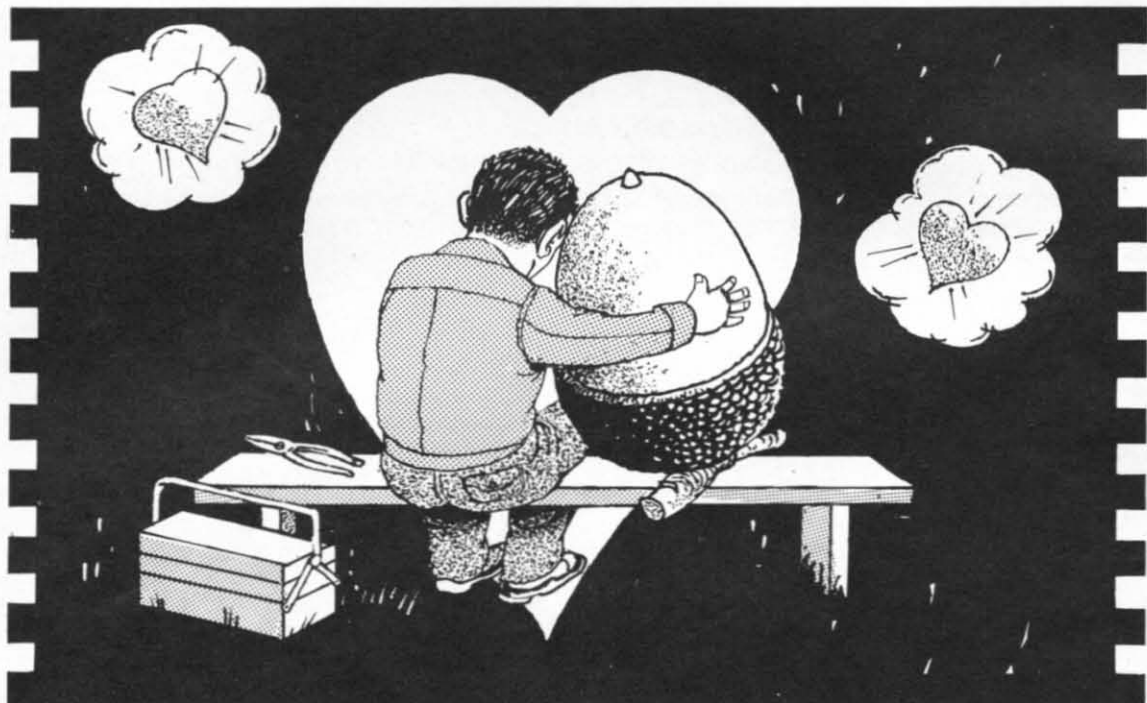
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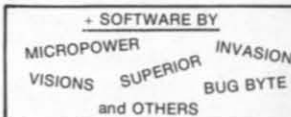
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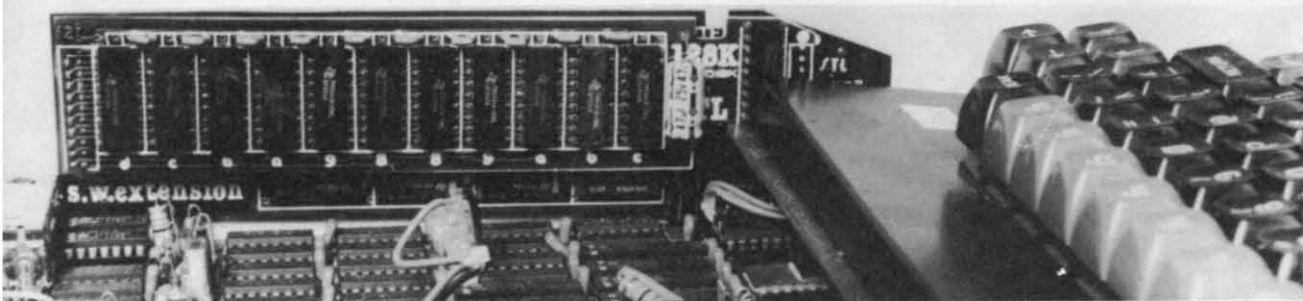
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HOW ABOUT COMPATIBILITY?

The Sideways RAM is completely compatible with all issues of BBC computers, disks, all sideways ROMs, second processor, Torch disk pack, Teletext, Econet etc. but NOT with ROM extension boards, since it can replace them.

Its power consumption is so low that you can use it in conjunction with twin disks.

HOW DOES IT WORK?

Occupying the same place as sideways ROMs (such as BASIC, DFS, CPN etc), it is treated like other Sideways ROMs and therefore can replace them.

The Machine Operating System uses Sideways RAMs as naturally as Basic, without procedures or programming rules.

Sideways RAM can run any language, any filing system including Hi-Basic and second processor DFS.

SIDEWAYS RAM POWER IS IN THE SOFTWARE:

Different from Sideways ROMs, Sideways RAM can be written into. This property gives birth to a NEW GENERATION of software for the BBC computer: SERVICE RAMs and VIRTUAL MEMORY PROCESSOR.

Each SERVICE RAM has its own commands and code as its counterpart Sideways ROM but has its own private workspace and storage area thus leaving you with the lowest possible PAGE value (PAGE = &E00). On the other hand, the Virtual Memory Processor can run huge MACRO BASIC programs (Megabytes are not the limit), keep them on disk and uses the basic 32k of RAM as transient program area. All software for the Sideways RAM system is free.

FREE SOFTWARE?

Solidisk Sideways RAMs are bundled with lots and lots of software, FREE and we mean FREE, now and later. It is quite simple: for every Sideways RAM sold, £1 is spent on MORE software. Sideways RAM users are invited to spot new applications and contributions are rewarded at the usual rate of £1 for every 4 bytes of machine code. The result is printed on the opposite page.

HOW ABOUT THE FUTURE?

Solidisk Sideways RAM is also widely used in schools for ECONET stations, by professional programmers for writing programs, research laboratories for RAM disk data base, at home for wordprocessing and now even games.

New areas are being developed: Telesoft and Teletext logging, Speech Processor assembler and Relational Data base to cite a few.

As the price of 16k EPROMs are as high as £20 at the present time, more Sideways ROM software publishers will be willing to sell their software on disk. Solidisk will mail FREE OF ANY COST their advertisement to ALL Sideways RAM users providing the price of the Disk version reflects savings in the cost of the ROMs. Solidisk believes that the majority of BBC users will have their Sideways RAM fitted before the end of next year.

Also unlike other makes (SIR, APTL, WE Sideways ROM/RAM extension boards and the Aries B20), Solidisk Sideways RAM is expandable from 16k right to 128k and now to 208k. As a result of VLSI technology and volume of sales, Solidisk products also have a lower shop price than any other products.

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Remove the keyboard from the BBC computer and instal it in the new case. Replace the old 3" keyboard tail by the new 24" cable and you can work really in comfort even for very long hours. The keyboard case is more a productivity tool than just ergonomics.

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Replace the top of the BBC computer case by this metal CPU case. Sit your monitor on top (it is tough enough to take even your weight!). The CPU case has 2 compartments for half height 5.25" disk drives with fixing screws, air vents and provision for a bolt-on fan. At first sight, there is no trailing wire. Looking inside, there is enough room to accomodate Teletext Adapter, Second Processor, Solidisk and a fan!

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2 versions of this double density interface will be available: as direct replacement for the Acorn Disk Interface (Version A) and as a Second Disk Interface (Version B) adding to your existing interface. They all use the same Western Digital controller chip (WD1770). Price £39.95 inclusive

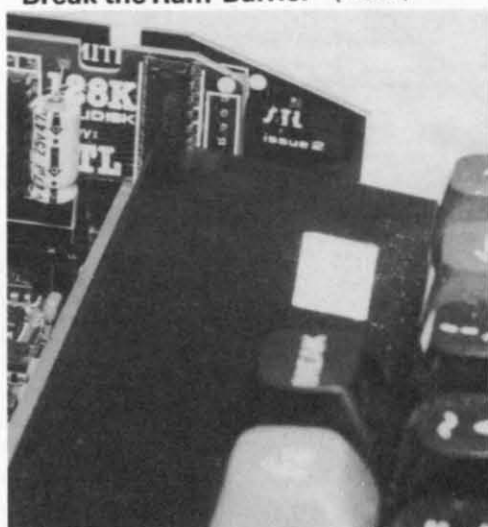
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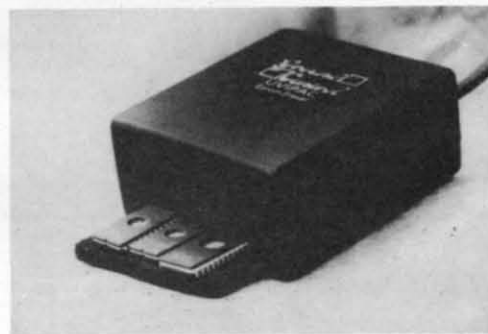
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INDEX:

INDEX is a Service RAM, it stores all the entry points of one or several sequential data files such as mailing list, stock list, accounts etc, merges, sorts them in alphabetical order and gives instant access to any record. INDEX can handle 1,100 records of any size, any type, any number of fields.

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MACRO-BASIC is a program generator. You use a wordprocessor to create a command file which is then scanned by MACRO. MACRO uses other programs, subroutine libraries, text files (actually any or all files on your disks) as source to generate a bug free BASIC program which can be very large (Megabytes are not the limit).

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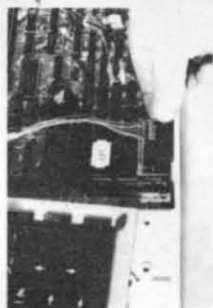
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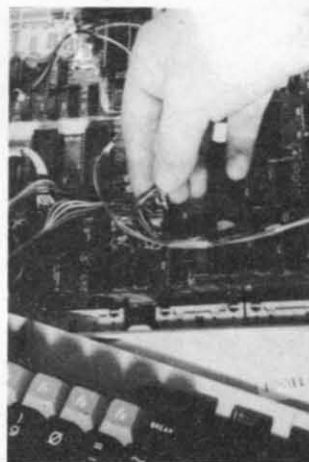
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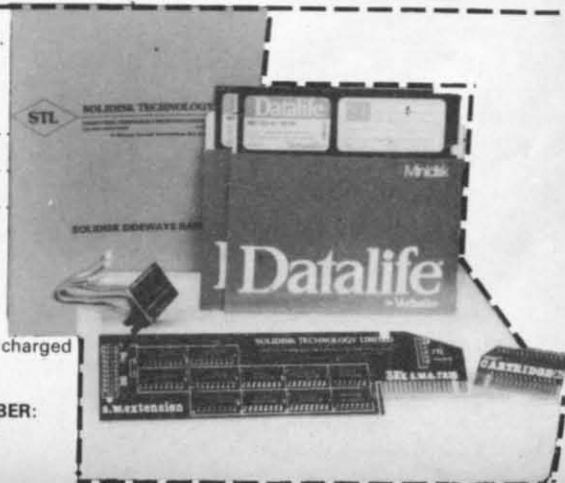
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Making the most of View

By PETER THORNE

ONE of the most useful and well known features of Wordwise is the ability to program the function keys so that they can be used in Edit mode to print "at-a-stroke" words that are needed frequently, to provide new editing commands such as indentation for paragraphs and to set up codes to access special features of printers and so on.

This is clearly described in the manual and the use of the facility is also encouraged there.

Despite there being no mention in the manual, a similar feature is available in View. Keys can be defined in the usual way, but they are accessible only after entering *FX 228,1 from Command mode and then using Shift and Ctrl with the function key.

The interesting point is that the keys can be used in both Text and Command mode. Most editing commands are already provided by View so the most obvious use of the programmed keys is to print commands such as FORMAT, SCREEN in Command mode or often-used words and phrases in Text mode. A key can also be used to load a printer driver as in:

```
*KEY 1 PRINTER EP | M
```

However the keys can also be programmed to insert stored commands in the text and this provides a simple method of "customising" View. To do this it is necessary to know the Ascii codes for the View function keys and the

sequence of symbols that will produce them. Here they are:

	key	Ascii	Symbols
		140-149	!!L - !!U
SHIFT+key		156-165	!!\ - !%
CTRL+key		172-181	!! , - !5

In effect, !! before a character adds 128 to its Ascii code and | before a character reduces its Ascii code by 64.

As an example, to produce a page with a heading margin of 2, a footer margin of 3 and a left margin of 4, turning off justification at the same time, one could use:

```
*KEY 0 | ! $ HM | M2 | M | ! $ FM | M3 | M  
!! $ LM | M4 | M | ! /
```

Spaces have been inserted for clarity.

The key definitions can be programmed from a !BOOT file thereby automatically configuring View to the user's requirements, but I normally use a Basic program to achieve this. The listing below is an excerpt from such a program:

```
100 DEF PROCview  
110 *FX 228,1  
120 *KEY 0 FORMAT | M  
130 *KEY 1 PRINTER EP | M  
140 *KEY 2 SCREEN  
150 *KEY 3 SHEETS  
160 *KEY 4 CLEAR  
170 *KEY 5 EDIT  
180 *KEY 6 QUIT  
190 *KEY 7 .....>.....*.....*.....  
*.....*.....< !!4 | M  
200 *KEY 8 BARBLY HIGH SCHOOL COMPU  
TING DEPARTMENT | M  
210 *KEY 9 | ! $ HM | M2 | M | ! $ FM | M3 | M  
!! $ LM | M4 | M | ! $ SR | MP | M | ! / | M  
220 *KEY 10 OLD | M *FX 228,1 | M  
230 *FX 138,0,129  
240 *WORD  
250 ENDPROC
```

Most definitions are obvious, but key 7 generates a new ruler, key 8 a frequently used phrase, key 9 a standard page format and key 10 prevents Break causing loss of text and reactivates the function key definitions. Line 230 automatically loads the printer driver when the program is run.

If you feel you need more pre-programmed keys you can also define the cursor and copy keys.

Spool omission corrected

It is often desirable to produce text that is readable by those who do not have access to the same BBC word processing system as was used to produce the original document.

Wordwise has the facility to spool text which may later be printed from disc using *TYPE. View lacks this command and it seems a surprising omission.

View files can be *TYPed but if there are any rulers present results are unpredictable and untidy. However I have discovered that spooled text can be

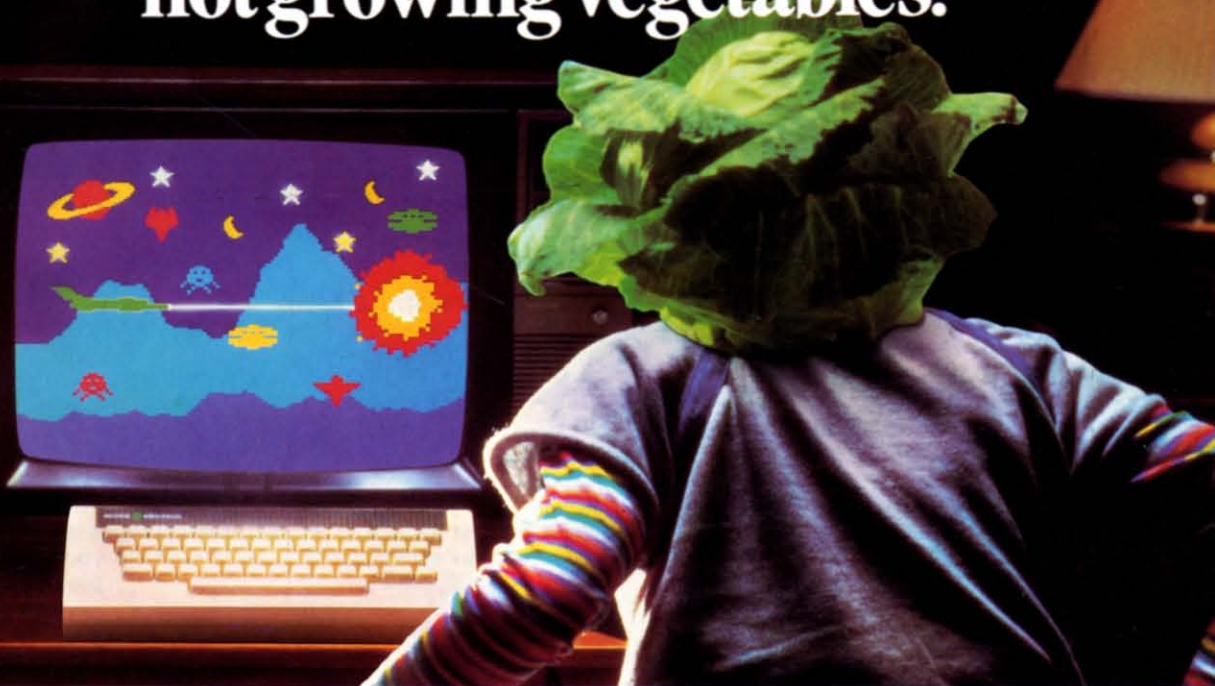
produced by the somewhat devious method described below.

After the text has been saved in the usual way, type *SPOOL (new file name), SCREEN (old file name) and then *SPOOL. This creates a spooled file but it contains some unwanted material.

Read this file and edit it. At least one line at the beginning and several at the end will need deleting. Save this text and you will now have your spooled version in a continuous format which can be sent directly to a printer with *TYPE.

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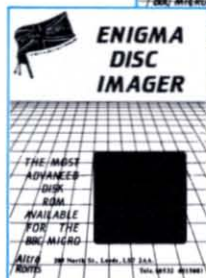
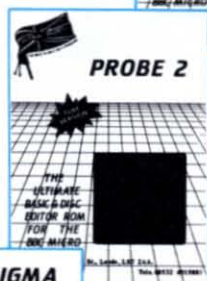
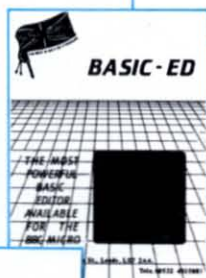
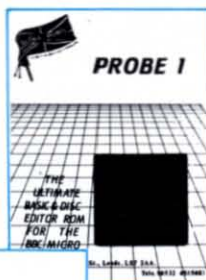
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We interrupt this program to bring you ...



**By ROLAND
WADDILOVE**

AFTER racking my brains trying to think of an original Christmas program I came up with Xmas Carol. It simply wishes everyone a Merry Christmas to the accompaniment of a few festive tunes.

You may be wondering where the originality is in that. Well, it's not what it does, it's how it does it. The program demonstrates the use of interrupts by playing carols while text is printed in different directions and with various degrees of rotation.

One of the most advanced features of the BBC Micro is the extensive use of interrupts to control many of the background operating system tasks.

An interrupt is a signal sent to the microprocessor telling it to stop what it is doing and switch its attention to something else. When it has finished this task it returns to whatever it was doing and carries on as if nothing had happened.

These background tasks include updating the clock, used by the pseudo variable TIME, processing envelopes, and maintaining the many input and output buffers and queues.

Interrupts give the impression that the machine is capable of doing more than one thing at a time by repeatedly switching rapidly between tasks.

Interrupts must not have any effect on the interrupted program. If any of the processor's registers or flags are altered by the interrupt routine, then it will get in a terrible muddle when it returns,

probably with disastrous consequences.

Acorn have thoughtfully provided the user with an easy to use, pre-packaged interrupt facility. Every 10 milliseconds one is generated to transfer program control to routines to deal with the background work.

In the process of carrying out this background work a number of events may be generated, such as the interval timer crossing zero. An event handling routine can be written by the user to which control is passed, when the appropriate event has been detected by the operating system.

The operating system detects all events but ignores them if they have not been enabled with a *FX14 command. If an event has been enabled then program execution indirects via the event vector at &220. (See page 242 of the manual.)

The machine code music routine in Xmas Carol is called 50 times a second, coincident with the start of vertical synchronisation of the screen display, by setting the event vector to point to the start of the code, and enabling it with *FX14.4.

When the code is called the registers and flags are saved, and as only one event has been enabled there is no need

to check that it is the right one.

First it is necessary to see if there is enough space in the sound buffer for the next note, otherwise the program would grind to a halt when it was full.

If there isn't enough room the registers are restored and the routine ends. If there is enough room, the next note and its length is read from the data stored at page &A and placed in the parameter block at &71. OSWORD is called to insert the note into the sound buffer.

A check is made to see if the pointer is at the last note. If it is then it is reset to the start again. The registers are restored and the routine ends.

All this happens while the BBC Micro is busy drawing the message on the screen, giving the appearance of doing two things at once.

The print routine works by printing the letter at the bottom left hand corner of the screen, and looking at the dot pattern produced. You can't see it as it is printed in colour 3 which is set to black, the same as the background.

By using some elementary trigonometry the dot pattern can be rotated and drawn at any position on the screen. A point I%, J% when rotated through an angle theta becomes:

$$\begin{aligned} I\% \cdot \cos(\theta) - J\% \cdot \sin(\theta), \\ I\% \cdot \sin(\theta) + J\% \cdot \cos(\theta). \end{aligned}$$

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From Page 85

odd shaped pixels in Mode 5 but it is fairly straightforward.

To print text round in a circle you just move to a point on the circumference $x\%$, $y\%$ which is $\text{radius} \times \sin(\text{theta})$, $\text{radius} \times \cos(\text{theta})$. To make the text stand outwards the angle of rotation is $-\text{theta}$.

The machine code is placed at &900

and the data for the carols at &A00, which are buffers used by the cassette system. It is safe to type in and run programs while the carols are playing, but loading or saving a program may corrupt the code so it is best to disable the routine with *FX13,4.

Don't just use the program as it is. Try experimenting with different tunes. (Lines 220, 230 and 790 must be set to the number of items in the data

statement, 254 maximum.)

Alter the messages printed and see what happens if the size of the letters is changed. Will it run in Mode 1? Try it and see! Alter it if necessary.

PROCstore_data

PROCEDURES
Disables start of screen synchronisation display event. Switches off ADC channels. Reads and stores data for tunes. Defines function keys.

PROCassemble

Assembles machine code routine to play carols. Sets event vector to point to code. Enables event.

PROCletters PROCprint

Prints the message.
Prints a character at a given angle and position.

VARIABLES
Used as loop counters.
Messages to be printed.
Angle of letter in radians.
Angle of letter in radians.
Position of letter.
Position of letter.
Size of letter.
Works out SIN and COS function to save time.
Letter to be printed.
Pointer to next note.
Parameter block for Oswald call.

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Xmas Carol listing

From Page 87

```

10REM *** XMAS CAROL ***
20REM *For Electron/Micro User*
30REM *By R.A.Waddilove*
40REM *Happy Christmas*
50ON ERROR GOTO 1320
60PROCstore_data
70PROCassemble
80MODE 5
90PROCletters
100TIME=0:REPEAT UNTIL TIME>500
110PRINT TAB(5,31);"Press Space";
120*FX21,0
130REPEAT UNTIL GET=32
140MODE 6
150PRINT""Function Keys :-""f1 -
LIST current program.""f2 - delete
current program.""f3 - end the car
ols."
160PRINT""Programs can be typed in
and run while the carols continue t
o play. To LOAD or SAVE a program pre
ss f3."
170END
180
190DEF PROCstore_data
200*FX13,4
210*FX16,0
220*FX70=244
230FORIX=244 TO 1 STEP-1
240READ JX:IX?&A00=JX
250NEXT
260*KEY1 "LIST07:M:INLIST:M"
270*KEY2 "NEW:M"
280*KEY3 "FX13,4:M"
290*KEY10 "?&220=0:&221=9:&FX14,4:
M"
300ENDPROC
310
320REM pitch,length,...
330
340REM **Silent Night**
350DATA 80,15, 88,5, 80,10, 68,30,
80,15, 88,5, 80,10, 68,30, 108,30, 96
,30, 100,30, 80,30, 88,30, 100,15, 96
,5, 88,10, 80,15, 88,5,80,10, 68,30
360
370REM **We Three Kings**
380DATA 96,18, 88,9, 80,18, 68,9, 7
6,9, 80,9, 76,9, 68,27, 96,18, 88,9,
80,18, 68,9, 76,9, 80,9, 76,9, 68,27,
80,18, 0,0, 80,9, 88,18, 0,0, 88,9,
96,18, 0,0, 96,9, 108,9, 100,9, 96,9,
88,9, 96,9, 88,9, 80,18, 76,9,68,40
390
400REM **Jingle Bells**
410DATA 96,5, 0,0, 96,5, 0,0, 96,10,
0,0, 96,5, 0,0, 96,5, 0,0, 96,10, 0
,0, 96,5, 108,5, 80,7, 88,3, 96,20, 1
00,5, 0,0, 100,5, 0,0, 100,7, 0,0, 10
0,5, 96,5, 0,0, 96,5, 0,0, 96,3, 0,0,
96,3, 108,5, 0,0, 108,5, 100,5, 88,5
, 80,40
420
430REM **Away In A Manger**
440DATA 52,10, 72,10, 0,0, 72,10, 8
0,5, 88,5, 72,10, 0,0, 72,10, 88,5, 9
2,5, 100,10, 0,0, 100,10, 108,10, 92,
20, 80,5, 88,5, 92,10, 0,0, 92,10, 10
0,10, 88,10, 0,0, 88,10, 72,5, 88,5,
80,10, 60,10, 68,10,72,40
450
460DEF PROCassemble
470pointer=&70
480sound=&71
490!sound=1
500sound!2=-15
510osword=&FFF1
520osbyte=&FFF4
530?&220=&00:&221=&09
540FOR pass=0 TO 2 STEP 2
550PX=&900
560C DPT pass
570PHP:PHA \save registers
580TXA:PHA
590TYA:PHA
600LDA #&80
610LDX #&FA
620LDY #&FF
630JSR osbyte \space in sound buff
er?
640CPX #10
650BMI end \if not enough
660LDY pointer
670LDA &A00,Y \get pitch
680STA sound+4
690DEY
700LDA &A00,Y \get length
710STA sound+6
720LDA #7
730LDX #sound MOD256
740LDY #sound DIV256
750JSR osword \play note
760DEC pointer
770DEC pointer
780BNE end
790LDA #244:STA pointer
800.end
810PLA:TAY \restore registers
820PLA:TAX
830PLA:PLP
840RTS
850J
860NEXT
870*FX14,4
880ENDPROC
890
900DEF PROCletters
910VDU 23,1,0;0;0;0;
920VDU 19,3,0;0;
930GCOL 0,2
940a$="Merry"
950FOR IX=1 TO 5
960PROCprint(MID$(a$,IX,1),2,PI/2,1
28,IX*64+330)
970NEXT
980a$="Christmas"
990b$="Everybody"
1000FOR IX=1 TO 9
1010PROCprint(MID$(a$,IX,1),2,0,IX*1
28-80,900)
1020PROCprint(MID$(b$,IX,1),2,-PI/2,
1144,900-IX*64)
1030NEXT
1040GCOL 0,1
1050a$="MICRO USER "
1060b$="ELECTRON USER"
1070FOR IX=1 TO 13
1080theta=RAD(IX*(360/14)-(90+360/14
))
1090xZ=639+200*SIN(theta)
1100yZ=452+200*COS(theta)
1110PROCprint(MID$(a$,IX,1),2,-theta
,xZ,yZ)
1120xZ=639+110*SIN(theta)
1130yZ=452+110*COS(theta)
1140PROCprint(MID$(b$,IX,1),1,-theta
,xZ,yZ)
1150NEXT
1160VDU 19,3,4;0;
1170PRINT TAB(8,7);"From"
1180ENDPROC
1190
1200DEF PROCprint(letter$,size,angle
,xZ,yZ)
1210LOCAL IX,JX
1220PRINT TAB(0,31);letter$;
1230cos=size*COS(angle)
1240sin=2*size*SIN(angle)
1250FOR IX=0 TO 64 STEP 4
1260FOR JX=0 TO 32
1270IF POINT(IX,JX) PLOT 69,IX*co
s-JX*sin,YZ+(IX*sin/4)+JX*cos
1280NEXT
1290NEXT
1300ENDPROC
1310
1320REM ** error **
1330MODE 6:VDU 19,0,4;0;14
1340REPORT:PRINT" at line ";ERL

```

This listing is included in this month's cassette tape offer. See order form on Page 237.

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Herbie Briggs has just destroyed the myth that all floppy discs are created equal.

They seem equal. Until you look at the seams.

That's where equality ends.

Most companies seal their discs with a spot here, a spot there. Leaving most of each seam not sealed at all.

Sooner or later, the seams might do what comes naturally: they bulge. Warp. Pucker. Open up.

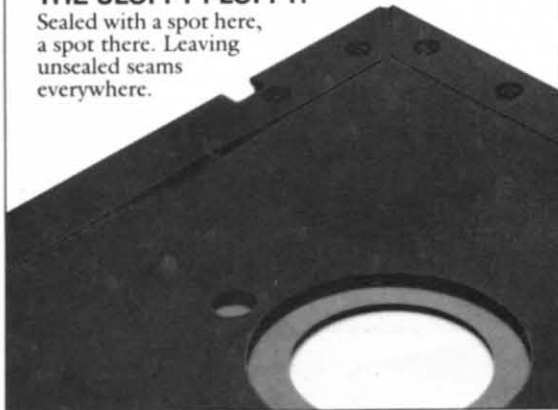
Pens, pencils, fingernails—even a four-year-old's, like Herbie—can catch and snag in those wide open spaces.

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SPECIALISTS IN ECONET

MIKE COOK'S PROBLEM PAGE



When the tide comes in on the TV

I HAVE had a BBC Micro Model B for about seven months. Since January, I have used a Ferguson TX 14in colour portable television with it.

For the vast majority of times the combination works well, but occasionally I get a wave motion moving up the screen. This clears itself after a while and needs no refocussing to get rid of it.

I have called in the television engineer and he says that the TV is perfect. The micro has been back to the suppliers three times and I still have a "rippling screen".

Can you help me please? I do not know what to do now to get this problem sorted out.

I am actually out of the warranty period, but since the fault is still there the suppliers are willing to forget that fact, since even their own engineer cannot sort out the fault. — Joan Jackson, Crowle, Scunthorpe.

● It is often the case with electronics that while each individual component of the system appears to work separately they will not work when connected together.

Let's look at the TV. This was made for viewing programmes transmitted over the air from ITV or the BBC. It was not designed to be connected directly to a source of modulated video like your micro.

That fact that it will work is a bonus. What is happening is that some element of mains frequency is being injected into the signal path from somewhere. This is causing the wavy lines.

There are many causes of this. One could be earth loops. Try disconnecting the earth lead from one of the following: the micro or the TV set or the lead that connects the two together.

No letters please about the danger of disconnecting the earths, I only recommend one earth disconnected and the

equipment will still have protection if it is all connected up.

Try re-routing the lead that connects the two or changing the relative positions between the micro and the TV set.

If problems still persist, get your TV repair shop to increase the power supply decoupling inside the TV, or your micro dealer to fit extra decoupling on the UHF modulator.

Remember, it is the system that needs to be tested not the individual components.

American connections

I OWN a BBC Model B with a single, single sided, Teac floppy disc drive powered from the micro's auxiliary power socket.

I shall be moving to the United States soon and want to take it with me. I want to know if it is possible to modify the machine to work in the US and if so what the modifications would be.

I could get a transformer to change the voltage or modify the power supply. Presumably, as the floppy drive is powered from the auxiliary socket it will work.

The main problem, as I see it, is the video circuitry. Can I just change the UHF chip (UN 1233) or are there some additional changes?

I gather from the Advanced User Guide that I will also need an "American MOS" to take account of the different vertical

screen resolutions.

Could you tell me what circuit and chip changes are required? — R. Couchman, Shiplake, Henley-on-Thames.

● Unfortunately it is not so simple as changing the operating system chip.

The micro will work — providing you have the appropriate mains conversion transformer — but if you connect it to an American TV set the picture will overlap both top and bottom of the screen and also you will get very funny colours.

This is due to the different standards used for line frequency and colour encoding.

This necessitates redesigning some of the circuits on the BBC Micro and it would be extremely messy to try and do this on your existing board.

If you take an RGB monitor with you you could still run it with a voltage transformer.

However, because of the different mains frequencies you might get a wavy picture as the local mains "interferes" with the monitor.

Printer command

I HAVE a Shinwa CP-80 printer and cannot find the right VDU 1 command to make it print the £ in a program.

In a letter such as this, using Wordwise there is no problem using the embedded command

DP129, but outside Wordwise to any combination of VDU 1,27, 1,129 the £ prints as a '.

I have asked a number of other CP-80 users, and they are all beaten by this problem, and I don't know the agent or manufacturer's name and address to ask them.

I and others would be most grateful for your help. — G.I. de Glanville, Launceston, Cornwall.

● Why do you need to send the printer the 27? This tells it that there is a start of a control sequence. Try VDU 2,1,129,3.

This will turn the printer on, send value 129 to the printer (the £ value on this printer I think) and finally turn off the printer.

Using Fred and Jim

CAN I use Fred and Jim (FC00 & FD00) for programs?

For example, my joystick utility program needs some place that does not conflict with Bigger and Chuckie Egg. I cannot use my joystick utility program for the Voltmace joystick with either of these games.

Also, if I donate a disc drive or a similar piece of equipment to a school, can I claim a half price discount as most schools do when buying micro equipment?

How much does it cost to upgrade a model A — that

From Page 93

already has 32k and I think the 6845 (Rocket Raid works on it) – to put all the analogue and user port, etc, plugs in? – *Sean Violante, London SW7.*

● The locations Fred and Jim have no memory inside the machine allocated to them. If you want to use that space you will have to make a $\frac{1}{2}$ k memory to plug into the 1MHz bus.

Under an old scheme, schools could claim half the cost of their first micro off the government – you could end up in trouble if you tried to fiddle that.

It should cost you about £34 to complete your upgrade from the point you have reached.

Few words on speech

HOW does the Beeb's speech synthesiser work and where could I find details about it? – *Matthew Ekins, Northallerton, N. Yorks.*

● Well that's a tall order. But here it is simply.

Someone makes a recording of the words you need to say. In this case it was Kenneth Kendal – or was it Whinny Windermere?

This is then digitised and fed into a micro which then bashes the numbers about unmercifully with very hard sums. This produces a small "dehydrated" string of numbers much shorter than the original.

These numbers are then burnt into a ROM and are called a PHROM – standing for Phrase Read Only Memory.

When you want to reproduce the word, you send a command to the speech chip which in turn gets the correct sequence of numbers from the PHROM and re-hydrates them to give a close facsimile of what was originally said.

You could write to Texas Instruments, Manton Lane, Bedford MK41 7PA and ask for the data sheet on the TMS 5220 synthesiser. But I think you will find it very heavy going.

Double characters

OCCASIONALLY when I press the & key on my BBC

Micro the character appears twice on the screen. Sometimes nothing at all appears.

This suggests a dirty contact. Is this a fault involving return to the supplier or can something be done about it fairly easily?

My second problem involves the Wordwise program. Despite the assurances in the manual the embedded commands do not appear on my monitor.

The reason is probably that my monitor is black and green rather than black and white.

Is it possible to do something about this other than disconnecting everything and taking it downstairs to the colour TV? – *P.L. Owen, Birtsmorton, Malvern.*

● The switch contacts on the keys are sealed in a plastic membrane so it is very unlikely that they could become dirty. What most probably has happened is that a crack has formed in the soldered joint between the key connector and the printed circuit board.

However, the answer is simple: take a soldering iron and just re-melt the joint on both contacts of your suspect key.

I am not quite sure about your Wordwise problem. You should still see the effect of the embedded commands – later characters appear in a different shade. You won't actually see

the results of the f1 and f2 keys themselves – they appear as blanks.

Earth loop snag

I HAVE recently bought the Acornsoft Collector's Catalogue file program.

The file-creation program and the main data insertion program both loaded and worked on a friend's machine – using a BBC data recorder.

I managed to save and reload one file at home – using a Hitachi recorder.

Ever since then I have been unable to use the program properly. Every time I tried to load in a file, the micro started to load then came up with error messages (BLOCK?) and missed out great chunks of data, for example, between 02 and 09.

The only way I seem to be able to get round this problem is to remove the motor control lead from the cassette recorder when I save a file so that the tape does not stop/start each time the relay clicks.

The files will then load with the motor under micro control that is, with the lead plugged into the recorder again.

Can you tell me what is wrong? – *Michael J. Cowie, Norbury London.*

● You have developed an earth loop problem – try disconnecting the earth lead off the mike or loudspeaker connection. This often cures it.

Memory needed

FOLLOWING the addition of an Econet system to our department, we find that most of our software will no longer load because of lack of memory.

Are there any suitable expansion boards on the market which will overcome this problem? – *V. Grasby, Computer Supervisor, Hartlepool Borough Council, Cleveland.*

● The simplest solution would be to download the software (relocate it) after it has been fetched from the network.

This would be the same that is required for disc users and has been published many times.

The Aries RAM card will give you some extra memory for programs that have high resolution screens, providing they have been written according to the "rules". Unfortunately not all programs have been.

Don't forget those Escs

FIRST a word of praise. I have recently retired and as a retirement project "and to stop the brains from becoming addled too soon" I have started to learn something about computing. I find your magazine excellent.

I bought a Mannesmann Tally Spirit-80 at The Electron & BBC Micro User Show in Spring this year to be used with my BBC B.

I am having great difficulty printing graphics and I hope you can help me. Please find enclosed the relevant pages from the "Operator's Manual".

Must I send the Control Code Esc K or L n1,n2. (VDU 1,27, 1,75 or 76), 1,n1,1,n2 for each line of printing?

Where I used to work, there is a H.P. printer model H.P. 82905 and its manual lists a program "TO COPY HP-83/85 CRT GRAPHICS TO THE

82905B".

Is there any similar program for the BBC B?

Could you send me a program for drawing, for example, a circle which will occupy several lines of graphics.

Then I should be able to sort out most of the above mentioned queries myself – given the time! – *C. Roberts, Erith, Kent.*

● Yes you must send the Esc code sequence for every line of graphics you send.

There are many programs that will copy a display to a graphics printer, these are called "screen dumps" and many have been published and are available commercially in ROMs.

From the manual extract you sent me, the codes match up one

of the modes of the FX80 printer, in fact the diagrams are identical in the two manuals.

You could therefore try the screen dump we published on page 103 of the January 1984 issue of *The Micro User*.

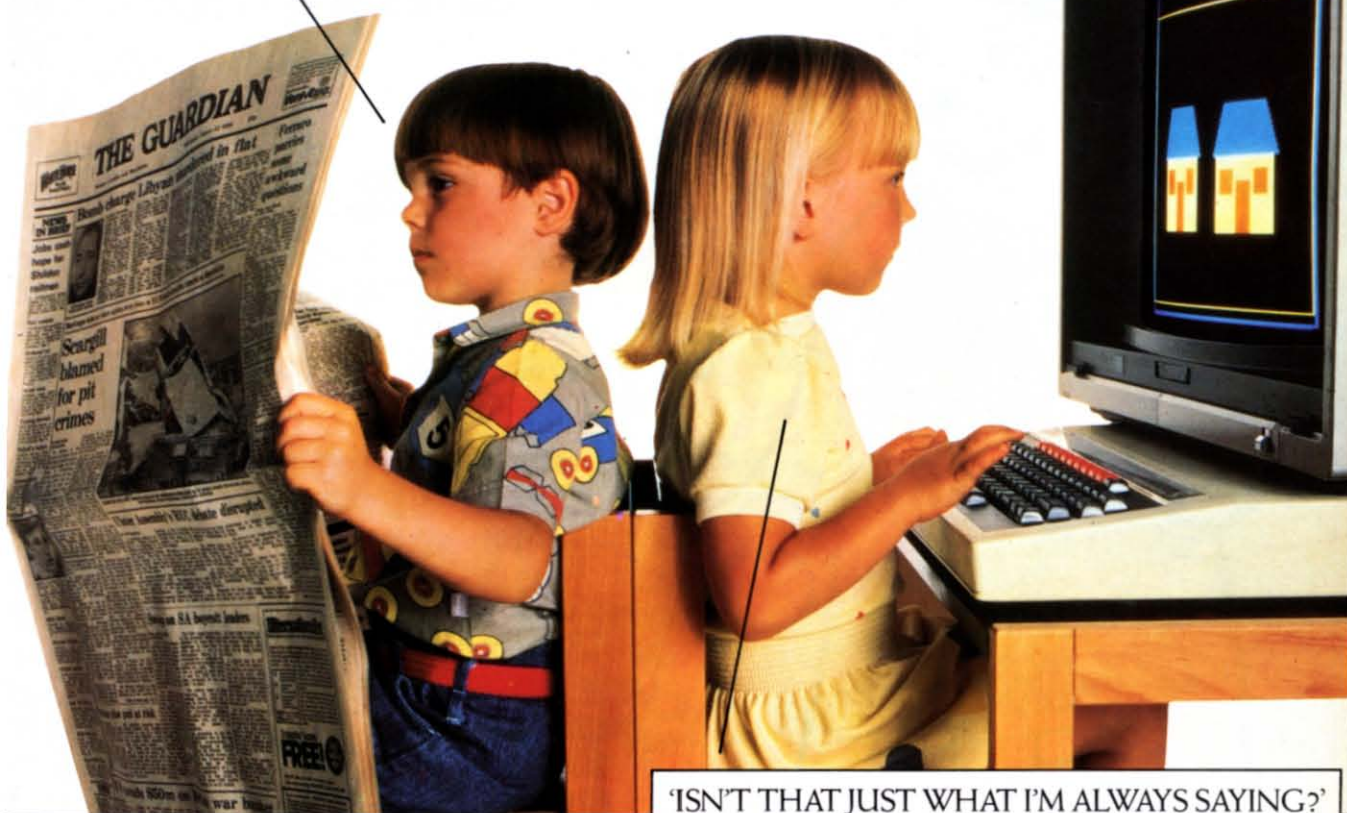
You might find your printer is only compatible with a subset of the FX80 commands and you would do better to look at the screen dump programs for the MX80 printer. However the basic principal of operation is exactly the same.

The only difference is how many dots can be printed on a single line. With the FX80 this can be 480, 960, 1920, 640, 576 or 720 whereas with the MX80 you just have the choice of 480 or 960 dots per line.

IF you have a technical query for this page, send it to Mike Cook, *The Micro User*, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 217.

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('Brilliant stuff for 3 to 6 year olds' was The Lady's verdict.)

All the games are designed to capture the child's imagination, with levels of difficulty increasing in line with ability.

But the real beauty of Mr T is that you and your children operate the games and learn together, opening up further areas of educational play away from the computer.

Mr T also provides a useful introduction to computers, each pack including full loading and operating instructions.

All the areas appropriate to your child's early learning are covered: numbers, letters, shapes, measuring, money, reading and telling the time, with at least two games per pack.

All the games are compatible with Commodore 64, Spectrum 48K and BBC B computers.

To sum up Mr T, we'll leave it to a seven year old boy interviewed by the Daily Telegraph: 'The best thing I've seen in my life' was his verdict.

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FROM GOOD HOUSEKEEPING



50p

Santa takes on the militant snowmen



By MARTIN HOLLIS

IN this seasonal version of the classic arcade game Santa Claus has many problems. A group of militant snowmen have persuaded some of Santa's toys and other Christmas related objects to form a band of Snowvaders to stop Santa from making his usual deliveries on Christmas Eve.

Poor Santa is under constant attack from giant snowballs thrown by these Snowvaders. If one hits him he slowly freezes to death.

He can hide behind two igloos but they only give him limited protection as eventually the snowballs will eat their way through.

To add to Santa's problems he must catch his runaway reindeer which periodically gallop across the sky.

After the titles and keys are displayed the first screen is drawn - four ranks of snowmen. The colourful graphics change with each of the 12 levels.

Levels 2 to 6 are alternate ranks of snowmen and other Snowvaders, levels 7 to 12 are each of the different Snowvaders on the whole screen for

each different level - Christmas trees, teddy bears, robots, Christmas stockings, eskimos and finally all the other Santas.

On the higher levels the Snowvaders advance down the screen faster than in levels 1 to 6. This is one of the two methods used to make the game progressively more difficult. The other involves how many hits Santa must achieve before a Snowvader is removed from the screen.

The number alters every two levels, as does the score for hits - one hit on the first two screens, two hits on the next two screens and three on the next two screens.

When you reach level 7 the number of hits needed starts again at one and follows the same pattern for levels 1-6.

The scores are:

Levels	1st rank	2nd rank	3rd rank	4th rank	Reindeer
1 & 2	10pts	20pts	30pts	40pts	80pts
3 & 4	2 times the scores for levels 1 & 2				
5 & 6	3 times the scores for levels 1 & 2				
7 & 8	4 times the scores for levels 1 & 2 etc.				

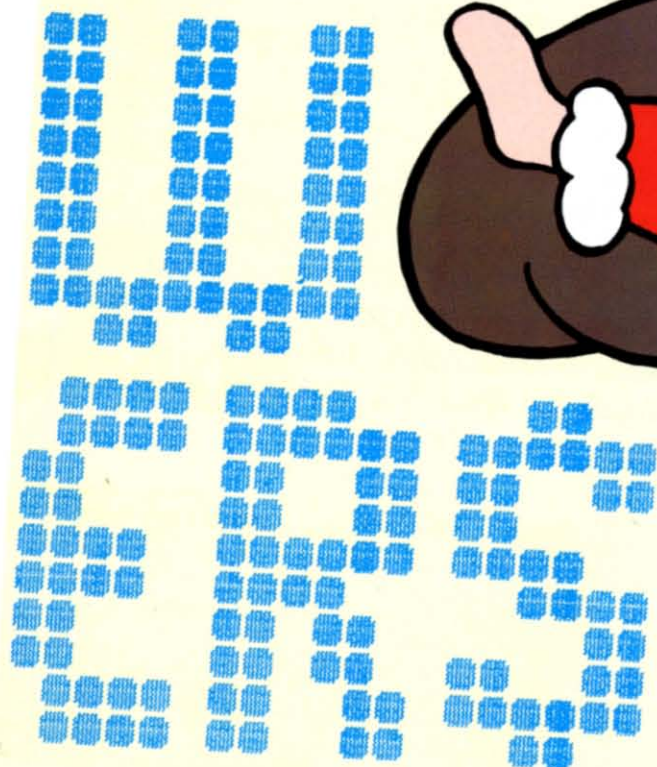
The game includes a high score table and some good sound effects, plus a suitable jingle. Part of the program is in machine code which improves the playing speed, making this game a good rival for some of the professional versions. Do take care when typing this part in.

If you want to check your program on the higher levels add this line which enables Shift to be pressed at any time while the game is being played and instantly moves you on to the next screen.

```
735 IF INKEY(-1) LEFT% = 0
```

It is also a good way to cheat and convince your friends that you're on Level 12, but note that it does not add anything on to your score for moving up a level.

in...



PROCEDURES

PROCvdu(N%)	Defines invaders graphics for different levels.
PROCigloo	Draws igloos, land and game information.
PROCmoveman	Moves Santa Claus.
PROCmb	Moves Santa's bullets.
PROCmfire	Fires Santa's bullets.
PROCv	Prints Snowvaders.
PROCb	Deletes Snowvaders.
PROCmovebs	Calls machine code routine to move Snowvaders.
PROCscoreup(N%)	Adds points to score, then prints.
PROCreindeer	Moves reindeer.
PROCplay(N)	Plays Jingle Bells. If N=0 plays normally else plays deeper and slower version for death music.
PROCsplat	Kills Santa by freezing over.
PROCass	Assembles machine code routine.
PROCinstr	Keys display.

PROCdisplay
PROChighscore

FNR

FNL

FNCHR(X,Y)

FNSCTI

VS(7)

SS(7)

C%(5)

H%(1)

REINS(2)

HI%(5) and HIS(5)

MACHCODE500

Displays high score table.
Inserts your name into high-score table.
Calls machine code to check right hand position of Snowvaders.
Calls machine code to check left hand position of Snowvaders.
Identifies which character at specified positions.
Defines score for different levels.

ARRAYS

Stores Snowvaders.
Stores spaces to blank out Snowvaders.
Six colours for different levels.
x and y co-ordinates for Santa's bullet.
Reindeer leg movement.
Hi-score table.
Sets aside 500 memory locations for machine code.

Keep right up to date with new developments in communications that will affect ALL our lives!



... the magazine that opens up the exciting new world of videotex and telecomputing, public and private viewdata, electronic mail, teletext, bulletin boards, teleshopping and telesoftware

By far the biggest single development in microcomputing this year has been the sudden explosion of interest in communications.

People have been discovering that with the aid of an inexpensive add-on to their home, school or office micro, linked to a phone line, they can communicate with other micros and with vast stores of electronic information – not only in Britain but all round the world.

The Micro User, has been responding to this ever-growing interest by printing special articles about communications. This, in turn, has produced considerable correspondence from readers wanting to know much more about this fascinating subject.

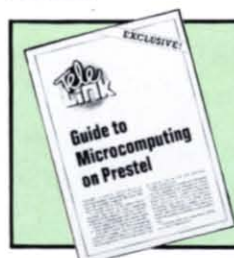
It is to satisfy the demand for knowledge about communications that TeleLink has been launched – to present the plain facts about all the changes now taking place in the whole field of communications. Changes that are going to affect all our lives.

TeleLink will deal with all aspects of communications as they affect people in offices, workshops, schools and the home. And in a way

that is understandable to everyone.

It will deliberately steer away from technicalities to present the facts in vivid detail. From inexpensive home computers swapping programs over the telephone line to giant computers exchanging data that can shape the economy of nations. From the linking together of communities by cable to the linking of continents by satellite.

And all that is going to make compulsive reading.



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The launch issue, now on sale, contains a unique Guide to Microcomputing on Prestel. It's the first detailed directory of its kind and contains a helpful Route Map to all the major sections of Micronet and Viewfax.

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KEYS

Z	Left.
X	Right.
SPACE	Fire.
Q	Turns all sound off.
S	Turns sound back to how it was before.
M	Music on.
N	Turns music off.
F	Flashing screen when Santa scores a hit.
G	Turns flashing off (some players may find the flash rather distracting).

The option keys can all be pressed during play. When game first played all are set to on. You have to turn off what you don't want.

STRING VARIABLES

SAS	Santa.
TSS	Top of snowmen.
BSS	Bottom of snowmen.
TVS	Top of Snowvaders.
BVS	Bottom of Snowvaders.
SPS	Spaces to blank out Santa.
REINH\$	Reindeer heads.



MAJOR VARIABLES

DEAD%	True if dead.
LEFT%	Number of Snowvaders left alive.
LEVEL%	Level you are on.
LIVES%	Lives left.
LDOWN%	True if Snowvaders went down a line on last move.
OHIT%	Number of hits needed to kill Snowvaders.
HIT%	Number of hits since last Snowvader killed.
X%	X coordinate of Santa.
L%	X coordinate of Snowvaders.
M%	Y coordinate of Snowvaders.
WI%	Width of Snowvaders on screen.
DE%	Height of Snowvaders on screen.
DIR%	Direction Snowvaders are travelling across screen.
RX%	X coordinate of reindeer.

Snowvaders listing

```

10 REM SNOWVADERS
20 REM MARTIN HOLLI$
30 REM (c) Copyright
40 REM MICRO USER
50 FLSH%=-1:JNGLEX=-1
60 DIMMACHCODE 500:PROCASS:MODE4
70 VDU23;B202;0;0;0;:PROCSNVA
80 REM*SANTA
90 ENVELOPE1,130,-3,0,6,84,10,72,0
,0,0,-5,126,0
100 ENVELOPE2,132,0,0,0,0,0,20,0,0,
0,-4,126,0
110 VDU23,224,0,0,3,7,15,5,4,10
120 VDU23,225,62,255,253,250,248,80
,16,40
130 VDU23,226,29,45,94,174,175,79,7
,15
140 VDU23,227,222,217,189,185,126,2
48,112,120
150 REM*SNOWMAN
160 VDU23,228,7,15,9,13,15,12,7,30
170 VDU23,229,224,240,144,176,240,4
8,224,120
180 VDU23,230,62,127,126,126,127,12
6,62,31
190 VDU23,231,124,254,126,126,254,1
26,124,248
200 REM*REINDEER'S LEGS
210 VDU23,236,31,63,95,139,4,2,2,2
,239,15
390 VDU23,252,126,255,255,255,195,1
29,0,0
400 VDU23,253,119,183,215,224,239,2
47,247,240
410 VDU23,254,247,247,247,0,127,127
,127,0
420 CLS:PROCINSTR:MODE5
430 DIMV$(7),S$(7),CX(6),HX(1),REIN
$(2),HIX(5),HIS(5)
440 RESTORE:FORAX=0TO6:READCX(AZ):N
EXT
450 SA$=CHR$17+CHR$1+CHR$224+CHR$22
5+CHR$10+CHR$8+CHR$8+CHR$226+CHR$227
460 TS$=CHR$17+CHR$3+STRING$(4,CHR$
228+CHR$229+CHR$32)+CHR$228+CHR$229
470 BS$=CHR$17+CHR$3+STRING$(4,CHR$
230+CHR$231+CHR$32)+CHR$230+CHR$231
480 TV$=CHR$17+CHR$2+STRING$(4,CHR$
232+CHR$233+CHR$32)+CHR$232+CHR$233
490 BV$=CHR$17+CHR$2+STRING$(4,CHR$
234+CHR$235+CHR$32)+CHR$234+CHR$235
500 S$=STRING$(4,CHR$32+CHR$32+CHR$
91+CHR$32+CHR$32
510 SP$=CHR$32+CHR$32+CHR$8+CHR$8+C
HR$10+CHR$32+CHR$32
520 REINH$=CHR$255+CHR$32+CHR$32+CH

```

Turn to Page 198

A World Of Information

Available to you with Nightingale, the new multi-function modem from Pace.

Nightingale is by far the most versatile modem available, at the price, for either home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) alongside 300/300 baud full duplex for communication between the BBC and other computers, including bulletin boards.

Nightingale will operate at both European and Bell frequencies for compatibility with CCITT and American systems.

The state-of-the-art modem chip technology employed in Nightingale requires minimal support circuitry resulting in low power consumption, low cost, high quality and extreme reliability.

Nightingale being 'hard wired' is not subject to the noise interference errors common to outdated acoustically coupled devices. In addition Nightingale features a simple self test facility for easy installation.

Nightingale utilises a fully buffered RS 423/232 serial interface and is supplied complete with a lead suitable for connection to the BBC micro, other leads are available on request.

However, in order to use such a versatile modem to its fullest potential, you will require equally sophisticated software. This is where Pace can offer you a total solution — Commstar, unquestionably the most comprehensive communications software available for the BBC.

Supplied on Eprom, Commstar is instantly accessible, simple to use and extremely flexible. Just look at the possibilities:— access Prestel, Micronet, Viewfax, Homelink and Telecom Gold, rummage through bulletin boards and chat to literally thousands of other computer users, but there's more. Commstar can be used to emulate specific terminal types such as VT 100 by means of a configuration disc, thus providing the opportunity to use the BBC as an inexpensive workstation for a main frame or mini-computer.

The complete Nightingale/Commstar package for the BBC micro including the modem, cabling and the Commstar Eprom and manual is just £139 plus V.A.T. Nightingale is available separately for the BBC and other computers at £119 plus V.A.T. and Commstar is £29.57 plus V.A.T. Further details are available, please telephone or write for comprehensive fact sheets.



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And now for
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GUARANTEED to provide hours of micro-addiction, **Pyramid Painter** is different from anything *Micro User* has previously published.

When you run the program you'll encounter a three dimensional pyramid of squares. Your task is to guide Pete the Painter over every square of the pyramid. To let you know how you're doing, they change colour when you first visit them - that's why they call you the painter!

The A key moves you diagonally up and to the left, and the * takes you diagonally up to the right.

Z will take you down and to the right, while ? moves you down and left.

Life would be easy for Pete if it weren't for the bouncing balls that come thundering randomly down the pyramid threatening to crush him if he's slow off the mark.

And in his endeavours to avoid the balls he mustn't go off the edges of the pyramid. That means instant annihilation.

The odds are balanced somewhat by a Tardis on each side. Get to either and you'll be transported immediately to the top of the pyramid.

You may be wondering what happens when you manage to paint all the squares. Well, you go to a higher level with greater difficulty, more bouncing balls, and Sid the Slimy Snake. And the least said about him the better.

When you run the program you'll find there are slow and fast alternatives. Might we respectfully suggest that you choose the former at first?

Oh - and we're sure you won't need it, but we thought we'd just mention that there's a freeze facility. Just press Delete. Copy will restart you.

When you're typing the game in, keep to the line numbers given - don't renumber.

After you've entered the game, and corrected any mistyping, enter the line:

1 ON ERROR GOTO 330

Happy painting!



GO PAINT A PYRAMID

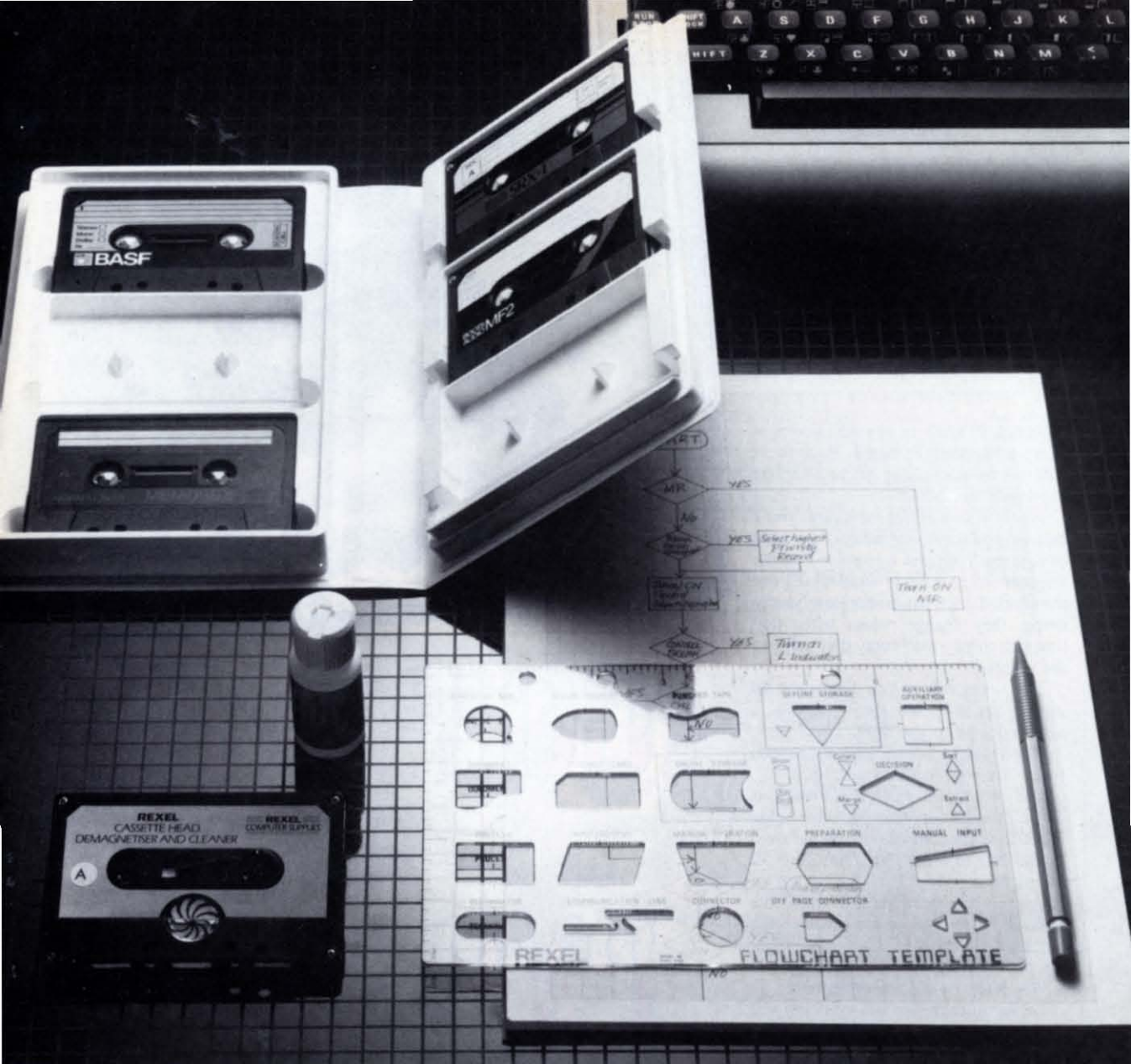
By JONATHON GILLIBRAND

PROCEDURES

men	Pokes memory (m-code).
screen	Sets up screen.
move_man	Moves you.
over	Colour in a square.
init	Initialises variables.
colours	Gets colours for each screen.
discs	Moves discs.
dead	Called when you die.
m_snake	Moves the snake.
dc	Checks if you're bit.
hi-table	Hi-scores.
inst	Instructions.
_check	Checks if you're in a Tardis or if you have coloured a new square.

VARIABLES

abert%	Number of lives left.
lvl%	Level number.
FILL%	Number of squares filled.
DX% (1-3)	X coordinate of discs.
DY% (1-3)	Y coordinate of discs.
sx%	X coordinate of snake.
sy%	Y coordinate of snake.
H1% (1-5)	Hiscore.
HIS (1-5)	Hiscore name.
X%	X coordinate of man.
Y%	Y coordinate of man.
BONUS%	Bonus left.
SC%	Score.
b%, b1%, C2%, C1%	Different colours of squares on each level.



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Everything you need to organise yourself and to operate and maintain your computer – cassette storage, programming, cleaning – all together in one complete kit.

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REXEL
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Pyramid Painter listing

From Page 101

```

10 REM PYRAMID PAINTER
20 REM (C) Micro User
30 REM* DO NOT RENUMBER
40 RESTORE1780:PROCmem(&D01,&D96)
50 RESTORE1800:PROCmem(&D98,&DBA)
60 RESTORE80:FORAZ=224TO246
70 VDU23,AZ:FORBZ=0TO7:READVX:VDUV
X:NEXT,
80 DATA1,3,7,15,31,63,127,255
90 DATA255,254,252,248,240,224,192
,128
100 DATA128,192,224,240,248,252,254
,255
110 DATA255,127,63,31,15,7,3,1
120 DATA255,255,255,255,255,255,255
,255
140 DATA0,0,0,30,18,30,18,254
150 DATA0,0,0,244,150,151,149,244
160 DATA0,0,0,165,165,165,164,189
170 DATA0,0,0,224,0,224,32,255
180 DATA0,32,96,252,252,96,32,0
190 DATA0,4,6,63,63,6,4,0
200 DATA0,244,132,132,135,132,244,0
210 DATA0,189,165,165,189,165,165,0
220 DATA0,47,40,168,107,41,47,0
230 DATA0,120,64,64,112,64,120,0
240 DATA0,239,73,73,73,73,79,0
241 DATA60,118,251,253,253,255,126,
60
250 DATA28,28,1,127,92,20,52,6
260 DATA28,28,64,127,29,20,22,48
270 DATA16,16,0,0,0,0,0,0
280 DATA0,0,56,124,124,84,84,124
290 DATA84,84,124,124,124,124,254,2
54
300 DATA96,240,184,252,12,28,120,22
4
310 DIM HIZ(5),HI$(5):FORAI=1TO5:H
IZ(AI)=1000:HI$(AI)="Joe Pyramid Pa
inter":NEXT
311 ENVELOPE1,1,10,20,30,0,0,0,0,0,
-1,-3,126,126:ENVELOPE2,0,-15,-15,-15
,255,255,255,30,0,0,-30,126,0:ENVELOP
E3,0,0,0,0,0,0,126,-8,-7,-7,126,30:
ENVELOPE4,3,-1,-1,-50,70,100,1,126,-2
0,-1,-10,127,0
320 DIMDX(3),DYX(3)
330 MODE7:VDU23;8202;0;0;0;:PROCins
t
340 REM MAIN LOOP
350 PROCinit
360 *FX15,1
361 MODE7:VDU23;8202;0;0;0;:PROCCh
table
380 MODE2:PROCinit:VDU5:PROCscreen
390 XZ=613:YZ=472:PROCCover(XZ-32,YZ
+16):FILLZ=FILLZ+1:SCZ=SCZ+10:PROCSna
ke_del:sxZ=0:DZ=10:BONUSZ=990:PROCl
391 VDU25,4,180;768;18,0,C2X,228
400 sxZ=0:DZ=10:BONUSZ=990:PROCl
410 PROCerase:IFqbertyZ=0 GOTO550
420 REM THE GAME
430 REPEAT
450 IFINKEY(-90)PROCCstop
460 EX=(EX+1)MOD2
470 PROCCmove_man:PROCCdc
471 IFUX=0 THENPROCCslow
480 IF1v1Z>3 ANDEX=0 PROCCdiscs(2):P
ROCCmove_man
490 IFsxZ=0 AND1v1Z>7 PROCSnake
500 PROCCdiscs(1):PROCCmove_man:IFsxZ
<0PROCCsnake:PROCCmove_man
510 PROCCdc:BONUSZ=BONUSZ-DZ:PROCCpla
y
520 IF1v1Z>7 ANDEX=1 PROCCdiscs(3):P
ROCCmove_man
521 IFUX=0 THENPROCCslow
530 UNTILFILLZ=36 ORqbertyZ=0
540 IFqbertyZ<0 PROCCflash:FILLZ=0:6
GOTO390
550 *FX15
560 GCOLOR,7:MOVE352,900:PRINT"GAME
OVER":PROCCtune
570 GOTO360
580 DEFPROCscreen
590 FORAZ=130TO1099 STEP128:PROCC(A
Z,200):NEXT:FORAZ=194TO1045 STEP128:P
ROCC(AZ,296):NEXT
600 FORAZ=258TO981 STEP128:PROCC(AZ
,392):NEXT:FORAZ=322TO917 STEP128:PRO
CC(AZ,488):NEXT
610 FORAZ=386TO853 STEP128:PROCC(AZ
,584):NEXT:FORAZ=450TO789 STEP128:PRO
CC(AZ,680):NEXT
620 PROCC(514,776):PROCC(642,776):P
ROCC(578,872)
630 VDU18,0,3,25,4,940;820;229,230,
231,232:MOVE940,788:DRAW940,730:DRAW1
190,730:DRAW1190,788
640 VDU25,4,50;800;18,0,3,235,236,2
37,238,239,10,8,18,0,3,233,8,8,23
4
650 VDU25,4,200;464;18,0,2,243,8,18
,0,9,243,8,18,0,2,244,8,10,245,25,4,1
029;464;18,0,9,243,8,18,0,2,244,8,10,
245
660 VDU4:COLOUR7:PRINTTAB(0,0)"SCOR
E:":TAB(14)"LVL:":VDU5
670 ENDPROC
680 DEFPROC(XZ,YZ):VDU25,4,XZ,YZ;1
8,0,12:CALL&D01:ENDPROC
690 REM MOVE MAN
700 DEFPROCmove_man
710 GCOLOR,C2X:MOVEXZ,YZ:VDU28
720 IF1v1Z<5 THEN *FX15,1
730 IFINKEY(-66)XZ=XZ-64:YZ=YZ+96:6
GOTO780
740 IFINKEY(-98)XZ=XZ+64:YZ=YZ-96:6
GOTO780
750 IFINKEY(-105)XZ=XZ-64:YZ=YZ-96:
GOTO780
760 IFINKEY(-73)XZ=XZ+64:YZ=YZ+96:6
GOTO780
770 GOTO790
780 SOUND0,3,4,2
790 PROCCcheck
800 colZ=POINT(XZ-5,YZ):IFcolZ=0 PR
OCdead:ENDPROC
810 IFcolX<C2X PROCCover(XZ-32,YZ+1
6):FILLZ=FILLZ+1:SCZ=SCZ+10
820 MZ=(MZ+1)MOD 2:GCOLOR,7:MOVEXZ,Y
Z:VDU24;1:MZ:ENDPROC
830 DEFPROCcover(AZ,BX)
840 GCOLOR,C2X:MOVEAZ,BX:CALL&D98:EN
DPROC
841 DEFPROCslow:IF1v1Z>7 ENDPROC EL
SEK=0
842 K=K+1:IFK<10 GOTO842 ELSEENDPRO
C
850 REM END OF LEVEL ROUTINE
860 DEFPROCflash
870 PROCCover(XZ-32,YZ+16):SOUND1,2,
200,50
880 FORGZ=100TO200STEP4:VDU19,C2X,R
ND(7);0;19,13,RND(7);0;19,14,RND(7);0
;:TIME=0:REPEATUNTILTIME>7:NEXT:REPE
ATUNTILTIME>100
890 FOR1Z=1TO6:VDU19,1Z,1Z;0:NEXT
900 WZ=C2X:PROCCcolours:VDU19,WZ,C1Z
;0;:SCZ=SCZ+BONUSZ:1v1Z=1v1Z+1:IFSCX>
EMX qbertyZ=qbertyZ+1:EMX=EMX+1000
910 ENDPROC
920 REM INIT VARIABLES
930 DEFPROCinit
940 qbertyZ=9:FILLZ=0:SCZ=0:MZ=0:1v1
Z=1:sxZ=0:syZ=0:JZ=0:1Z=0:CZ=1010:EMX
=5000:VDU23;8202;0;0;0;

```


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```

960 FORA% = 0 TO 3: DX%(a%) = 0: DY%(a%) = 0:
NEXT: P1% = 2: PROCcolours: ENDPROC
980 DEFPROCcolours
990 RESTOREC%: READb%, b1%, C2%, C1%: C%
=C%+10: IFC% = 1110 C% = 1010
1000 VDU19, 14, b%; 0: 19, 15, b1%; 0: 19, 12
, C1%; 0: ENDPROC
1010 DATA4, 1, 5, 3
1020 DATA4, 6, 2, 1
1030 DATA3, 7, 4, 5
1040 DATA7, 4, 1, 2
1050 DATA1, 7, 5, 3
1060 DATA6, 4, 1, 3
1070 DATA4, 7, 2, 5
1080 DATA2, 7, 4, 3
1090 DATA2, 6, 1, 3
1100 DATA7, 7, 4, 1
1110 DEFPROCplay
1120 VDU4: COLOUR7: PRINTTAB(6, 0); SCX;
TAB(15, 8)BONUSX; TAB(18, 0); 1v1%; IFBON
USX=0 DX=0
1130 VDU5: ENDPROC
1140 DEFPROCdead: PROCerase
1150 qbert% = qbert% - 1: SOUND1, 4, 120, 5:
IFPOINT(X%-5, Y%) = 0 VDU18, 0, 0, 25, 4, X%;
Y%; 228 ELSEPROCcover(X%-32, Y%+16)
1160 PROC1: TIME=0: REPEATUNTILTIME>2
00: X% = 613: Y% = 472: ENDPROC
1170 DEFPROCdiscs(J%)
1180 IFDX%(J%) = 0 ANDRND(4) > 1v1% ENDP
ROC
1190 IFDX%(J%) = 0 DX%(J%) = 613: DY%(J%)
= 856
1200 MOVEDX%(J%), DY%(J%): GCOL0, POINT
(DX%(J%) - 5, DY%(J%)): VDU228
1210 RX% = INT(RND(2)): DY%(J%) = DY%(J%) -
96
1220 IFDY%(J%) < 90 DY%(J%) = 856: DX%(J%)
= 613
1230 IFDY%(J%) = 856 GOTO1300
1240 IFRX% = 1 MOX% = -64 ELSEMOX% = 64
1250 P1% = POINT(DX%(J%) - MOX%, DY%(J%)):
IFP1% = 0 MOX% = -MOX%
1260 DX%(J%) = DX%(J%) - MOX%: SOUND1, 3, 1,
2: IFDX%(J%) = X% ANDDY%(J%) = Y% PROCdead
: GOTO1300
1290 MOVEDX%(J%), DY%(J%): GCOL0, 0: VDU
240
1300 ENDPROC
1310 DEFPROCstop: *FX15, 1
1320 REPEATUNTILINKEY(-106): ENDPROC
1321 DEFPROCerase: FORK% = 1 TO 3: MOVEDX%

```

```

(K%), DY%(K%): GCOL0, POINT(DX%(K%) - 5, DY
%(K%)): VDU228: DY%(K%) = 0: DX%(K%) = 0: NEX
T: ENDPROC
1330 DEFPROC1: VDU4, 31, 1, 30: PRINTSPC
18: TAB(1, 30): COLOUR7: IFqbert% = 0 VDU5
: ENDPROC
1340 FORA% = 1 TO qbert%: PRINTCHR$241; "
"; NEXT: VDU5: ENDPROC
1350 REM CHECK FOR HITS
1360 DEFPROCt_check: IFX% = 229 ANDY% = 4
72 ORX% = 997 ANDY% = 472 PROCup: X% = 613: Y
% = 856: IFPOINT(X%, Y%) < C2% THENPROCove
r(X%-32, Y%+16): FILL% = FILL% + 1: SCX% = SCX% +
10
1370 ENDPROC
1380 REM MOVE SNAKE
1390 DEFPROCsnake: IFFILL% > 20 ANDRND(
3) = 1 sx% = 613: sy% = 280
1400 ENDPROC
1410 DEFPROCsnake: PROCsnake_del: RX%
= INT(RND(4)): IFRX% = 1 s% = sx% + 64: sl% = sy%
+ 96
1420 IFRX% = 2 s% = sx% + 64: sl% = sy% - 96
1430 IFRX% = 3 s% = sx% - 64: sl% = sy% - 96
1440 IFRX% = 4 s% = sx% - 64: sl% = sy% + 96
1450 P1% = POINT(s%, sl%): IFP1% = 0 GOTO1
470
1460 sx% = s%: sy% = sl%: IFsx% = X% ANDsy% =
Y% THENPROCdead
1470 VDU25, 4, sx%, sy%, 18, 0, 7, 246: ENDP
ROC
1480 DEFPROCsnake_del: VDU25, 4, sx%, sy
%, 18, 0, POINT(sx% - 6, sy% - 5), 228: ENDPROC
1490 DEFPROCup: IFX% = 229 X1% = 22 ELSEX
1% = -22
1500 FORY% = 504 TO 856 STEP 34: VDU18, 0, 7,
25, 4, X%; Y%; 241: X% = X% + X1%: SOUND1, 1, Y% /
9, 1: VDU18, 0, 0, 25, 4, X% - X1%; Y%; 228: NEXT
: ENDPROC
1510 DEFPROCdc: FORK% = 1 TO 3: IFDX%(K%) =
X% ANDDY%(K%) = Y% PROCdead
1520 NEXT: ENDPROC
1530 REM HI-SCORE TABLE
1540 DEFPROCchi_table: IFSC% > H1%(5) TH
ENGOTO1630
1550 PRINT: FORA% = 1 TO 2: PRINTCHR$141; C
HR$134: SPC8"PYRAMID OF FAME": NEXT: PRI
NTTAB(10); STRING$(15, " "); FORI% = 1 TO 5:
PRINTTAB(3, I% * 2 + 5); I%; " "; CHR$133; H1%
(I%); "...."; CHR$135; H1%(I%): NEXT
1570 *FX15, 1
1580 PRINTTAB(4, 21)CHR$131; "PRESS: <
1> for a slow game"CHR$131; SPC4"OR:
<2> for a fast game"

```

```

1600 REPEAT
1610 UX% = GET: IFUX% = 49 ORUX% = 50 UX% = UX% - 49
: UNTIL 1: ENDPROC
1620 UNTIL 0
1630 PRINT "Please type your name:"
"(Max 20 Characters)" "1"; SPC20; "#":
INPUTTAB(1, 4)AA$: IFLEN(AA%) > 20 CLS: GO
TO1630
1640 LX% = 0: REPEAT: LX% = LX% + 1: UNTILH1%(LX
%) < SCZORLX% = 5: HX% = 6: REPEAT: HX% = HX% - 1: H1%(
HX%) = H1%(HX% - 1): H1%(HX%) = H1%(HX% - 1): UNTIL
HX% = LX%
1650 H1%(LX%) = AA$: H1%(LX%) = SCX%: SCX% = 0: C
LS: GOTO1550
1680 REM INSTRUCTIONS
1690 DEFPROCinst: PRINT: FORA% = 1 TO 2: PR
INTCHR$141; CHR$134; SPC9"PYRAMID PAINT
ER": NEXT: PRINTTAB(11) "RAT SOFT - 1984
..."
1700 PRINT "Move around the 3D pyrami
d, painting "the blocks as you go. Jum
p in the tardis" "to avoid the discs
and Sid the snake, "who appears on 1
ater levels."
1710 VDU28, 2, 23, 39, 11: PRINTCHR$131"
USE THESE KEYS: "CHR$133" A = Northwe
st * = Northeast "CHR$133" Z = Sou
theast ? = Southwest"
1720 PRINTCHR$129"DELETE = Freeze C
OPY = Continue" SPC9; CHR$133"ESCAPE =
Restart"CHR$136" EXTRA MAN EVERY
5000 POINTS"CHR$131; SPC8"TAB SPACE
BAR"; REPEATUNTILGET=32: ENDPROC
1730 DEFPROCtune: RESTORE1740: FORnote
= 1 TO 11: READp, d: SOUND1, 1, p, d: SOUND1, 0,
0, 1: NEXT: ENDPROC
1740 DATAB1, 16, 81, 12, 81, 4, 81, 16, 93, 1
2, 89, 4, 89, 8, 81, 8, 81, 12, 77, 4, 81, 24
1750 DEFPROCaeem(CX%, DX%): FORA% = CX% TO DX%
STEP 5: READB%
1760 ?AX% = &A9: AX% ?1 = B%: AX% ?2 = &20: AX% ?3 = &
EE: AX% ?4 = &FF
1770 NEXT: DX% ?1 = &60: ENDPROC
1780 DATA&E0, &E2, &8, &8, &A, &E3, &E1, &1
2, 0, &E, &8, &E0, &8, &A, &E4, &8, &A, &E1, &8,
&8, &12, 0, &F, &E3, &8, &B, &E4, &8, &B, &E2
1790 ENDPROC
1800 DATA&E0, &E2, &8, &8, &A, &E3, &E1

```

This listing is included in this month's cassette tape offer. See order form on Page 237.



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Get on the ball this Christmas ..

Play footsie with Space Invaders

WITH the festive season upon us again I thought we could do something to while away the hours between one lot of food being eaten and the next arriving. Traditionally this is the time for games so let's see what we can build to make our games that bit different.

This project started over a pint of ale at dinner time. The boss came up to me and said he wanted something he could use to get a better feel for a ski game — "a sort of joystick for the feet", he said.

I said I would look into it and we left it at that. Well, as I got a pint out of it, my conscience started to prick me and so I mulled it over.

I thought it would be possible to arrange gearing to move a pair of potentiometers from a foot-mounted board but they would have to be heavy duty and expensive. Then I thought of a switch joystick — I could mount micro switches that would detect a tilt.

The word tilt made me think of the days when I used to play on pinball machines. The machines had a habit of accusing me of tilting, just when things were getting exciting. And there was my answer, the good old mercury switch!

Mercury is a most curious metal. As you all know it is liquid at room temperature and, like most metals, it conducts electricity.

I first came across it when I was about eight. The school caretaker had smashed a large thermometer on the concrete path near the boiler house and left lots of very small beads of mercury all over the path.

With the infinite patience that only small children with a purpose can exhibit, we painstakingly collected it using a sheet of paper to coax the beads to amalgamate. When a sizeable piece



By MIKE COOK

had been formed it was chased onto the paper and into a small plastic box. My prize after many days was a blob of mercury about the size of a large pea.

Now I did not know it at the time but mercury is highly toxic and said to cause brain damage so it is not a thing I would recommend now, which is a pity because it is fascinating stuff. Still you can get sealed mercury switches and

these are what we will use.

There are two types of switch. With the first you can get an indication of a tilt in any direction. This is achieved by having a pool of mercury surrounded by a ring. Any deviation from the vertical and the mercury makes contact with the ring so making an electrical circuit. (See Figure 1.)

The second type will detect tilts in just one plane. Two contacts are at one end of a tube with a ball of mercury making contact when the tube is tilted. (See Figure II.) It is this type we will use for our foot-operated joystick.

The principle is very simple. If we

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Part 21

mount four mercury switches suitably on a board we can detect by the closing of one or two switches which way the board is tilting.

If the board is mounted on a hemisphere we will have to do something to stop it falling over, so we can use our feet to balance each end of the board and use ankle control to tilt the board to right or left. Of course the less acrobatic of us will need to be seated while this is going on.

It would be useful if this foot joystick were compatible with conventional joysticks, so we must connect it to the analogue input port.

The full circuit is shown in Figure III. You will see that it consists of two identical halves. The analogue input is held at half the reference voltage by the two resistors R1 and R2 (or R3 and R4). This is the normal situation when no mercury switch is closed.

Now, suppose the board is tilted forward. S1 will close, putting the analogue input up to the reference voltage thus giving a maximum reading. If the board is tilted back, S1 opens and then S2 closes, putting the analogue input to ground so giving a zero reading.

The same thing happens when tilting the board from side to side. Thus the board behaves like a conventional switched joystick.

Now there is one slightly strange addition to the circuit – the fire button input which is connected to the reference voltage. This is so that when both switches are closed the fire button will be pressed.

Well how is this possible? Surely you cannot tilt both forwards and backwards at the same time? Well you can if you give the board a sharp flick backwards and then forwards.

What happens is that the rapid movement coupled with the inertia of the heavy mercury causes both switches to be momentarily closed. This shorts out the fire button and the reference voltage to the ground. This will not harm the computer in any way as the reference voltage is derived from a high impedance supply.

There is a bit of a knack to it but you should soon be able to fire at will. (He always gets it, doesn't he? Poor Will!)

The switches can be mounted on a small piece of Veroboard. I had to use a little tinned copper wire to extend the

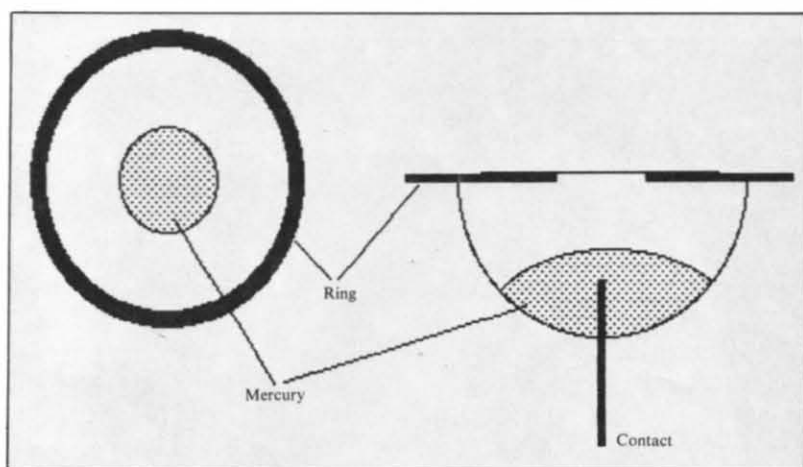


Figure I: Mercury ring tilt switch

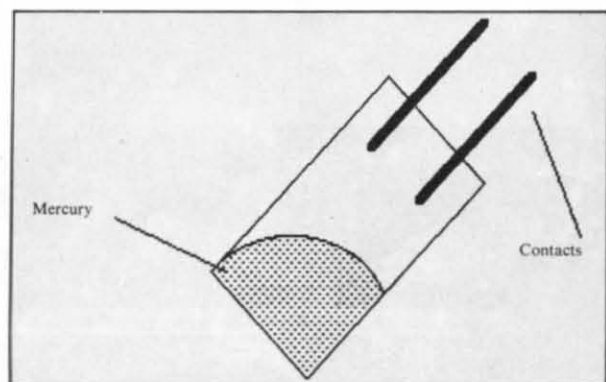


Figure II: Mercury tilt switch

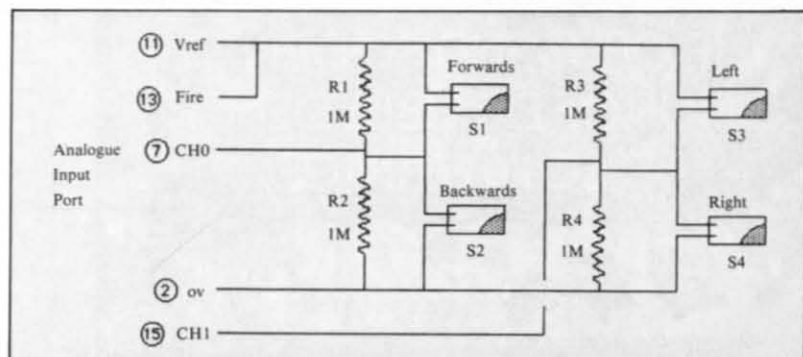


Figure III: Circuit of the foot-operated joystick

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From Page 107

wires coming from the switches to allow them to be mounted at a suitable angle. The switches can then be bent to give any degree of sensitivity.

When adjusted they may be enclosed in a small box or covered in plasticine or resin to prevent them from moving.

The switches are mounted on the underside of the board. I used a piece of 11in x 12in thick plywood. Stand with your feet apart on the board and trace round them with a pencil. Then cut the outer edges to the outline of your feet and paint the feet area one colour and the rest of the board another colour.

Now comes the tricky part. We have to have a dome fixed to the underside about 3in to 5in diameter. This is where a little ingenuity comes in. It has to be strong enough to support a good deal of weight and not cost a lot.

While musing around the local DIY shop, I came up with the perfect answer, a ballcock! These are available in plastic for about 40 pence. Slice one in half and you have a perfect hemisphere. If you are making two there is no need to discard the other half.

The only unfortunate side effect of doing this was that my two and a half year old son showed a keen interest in ballcocks for the next few weeks, insisting upon seeing them in every house we visited.

The plastic moulding is a little thin and so you can fill it up with something to add a little extra weight. I used sand and poured a little fibreglass resin filler over the top to seal it. This can then be fixed to the board with a metal collar if you are good at metal bashing or more resin if you are not.

I put a few screws into the board to dip into the resin and allow it to get a good grip.

Then the half ballcock must be supported to keep the whole thing upright when placing the board on as it takes some hours to set. The general arrangement can be seen in Figure IV.

The switches can now be fixed to the

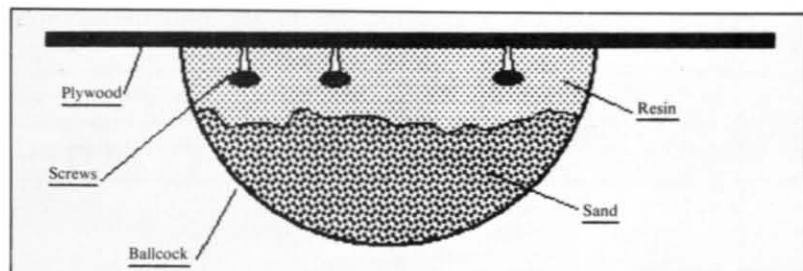


Figure IV: Fixing the two parts

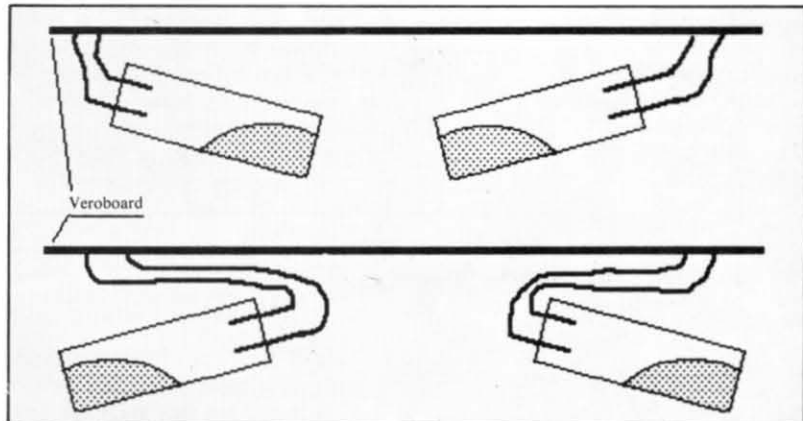


Figure V: Changing the sense of the switches

underside of the board and a cable brought out to the analogue input socket. To prevent any strain being placed on the Veroboard, the cable must be anchored to the board with a cable clamp of the type used on TV aerial down leads.

You are now ready to use the foot-operated joystick. Listing I is a short training exercise. Sit down on a chair with your feet flat on the board. Balance the board so that it is horizontal. You can then move the letter X around the screen by tilting the board.

By flicking the board rapidly back and forwards you can trigger the fire button and leave a permanent X on the screen.

The feel of the board is important and I was unsure how to make it react. The obvious way is to make the X move to the left when the board is tilted to the left and down when tilted back. However I

found it better if you arrange the X to move up the screen as you tilt the board back.

This is purely a matter of preference and you can alter the behaviour of the board by tilting the switches the other way so be sure to leave plenty of wire on them to adjust. (See Figure V.)

Having got the feel of the board I started to use it on some commercial software. I tried it on the old favourite Snapper and found it had turned into a totally different game.

I then tried it with Rocket Raider and found it most exhilarating. I think it was easier to steer the rocket with my feet leaving my hands free to fire the various weapons. The involvement of more physical movement added a great deal to the game for me.

Reaction to the board at the office



Component list for Body Build Pack 18: S1-S4 mercury tilt switches. R1-R4 1M resistors. One 15 way D-type plug and shroud. Three yards of four-way miniature cable. One piece Veroboard. Two cable clips. Four double sided sticky foam pads. One foot of 20 SWG tinned copper wire.

From Page 109

was very favourable and everyone found it a new experience and quite fun.

Well that's one device we can make with our mercury switches, but how about using two of the switches in the same circuit but mounting them at the end of an eight foot pole. You can then play at walking the high wire.

Put a line or cord on the floor and the players have to walk down it holding the pole without overbalancing it. The time taken for the walk is timed by the computer and penalty time points are added to the time for how long the pole is over-balanced.

Listing II shows this program. The time is manually started and stopped by pressing the space bar. However if you have a heart rate monitor board (Body Build Pack 11, April 1984) you could attach a small tube to the sensor and emitter and use it to detect when someone walks in front of it.

It should have about a four feet range when the amplifier is turned up to full gain. This could be used to detect the player crossing the finishing line and add an element of automatic timing.

Other bizarre arrangements come to mind. What about a hat with mercury switches built into it to help with deportment training? Or mercury

THE BEEB BODY BUILDING COURSE

switches attached to your pint pot to give early warning of you tilting it the wrong way and so pilling some?

It's Christmas so have fun! See you next month.

```
10 MODE 7
20 PRINT TAB(0,6);"THE BEEB BODY B
UILDING COURSE"
30 PRINT "MICRO USER DECEMBER 84"
40 PRINT
50 PRINT"Foot-controlled Joystick T
raining"
60 PRINT
70 PRINT"By Mike Cook"
80 PRINT
90 PRINT"PRESS ANK KEY TO START"
100 *FX16,2
```

```
110 AX=GET
120 MODE 4
130 IX=10
140 GCOL 3,1
150 VDU 5
160 XZ=500:YZ=500
170 REPEAT
180 DX=XZ:OY=YZ
190 AX=ADVAL(1) DIV 64
200 BX=ADVAL(2) DIV 64
210 IF AX> 600 THEN XZ=XZ-IX
220 IF AX< 200 THEN XZ=XZ+IX
```

```
230 IF BX> 600 THEN YZ=YZ+IX
240 IF BX< 200 THEN YZ=YZ-IX
250 IF XZ>1240 THEN XZ=1240
260 IF XZ<0 THEN XZ=0
270 IF YZ>1024 THEN YZ=1024
280 IF YZ<0 THEN YZ=0
290 MOVE OX, OY
300 IF (ADVAL(0) AND 1)=0 THEN PRI
NT "X"
310 MOVE XZ,YZ
320 PRINT "X"
330 UNTIL FALSE
```

```
10 REM TIGHT ROPE WALKER
20 REM By Mike Cook
30 MODE 7
40 S=0
50 *FX16,1
60 NCHAMP$=""
70 MINSORE=99999999
80 REPEAT
90 CLS
100 PRINT TAB(10,0);"TIGHT ROPE WAL
KER"
110 PRINT"For use with the Mercury
balancing pole"
120 PRINT CHR$(134);"SEE BEEB BODY
UILDING COURSE No.21"
130 PRINT" December 1984 By Mike Co
ok"
140 IF S=0 THEN S=1:PRINT TAB(0,11)
:GOTO 450
150 IF NCHAMP$="" THEN 190
160 PRINT:PRINT CHR$(131);"TODAYS C
HAMPION IS ";CHR$(136);NCHAMP$
170 PRINT CHR$(131);"WITH A LOW SCO
RE OF ";MINSORE
180 PRINT TAB(0,11),STRING$(60," ")
190 PRINT TAB(1,11);"Press the S ke
y when you start"
200 PRINT"And the SPACE BAR when yo
```

```
u finish"
210 REPEAT
220 LX=ADVAL(1) DIV 64
230 IF LX<10 THEN PRINT TAB(10,10);
"LEFT" ELSE PRINT TAB(10,10);SPC(4)
240 IF LX>1000 THEN PRINT TAB(20,10
);"RIGHT" ELSE PRINT TAB(20,10);SPC(5
)
250 UNTIL INKEY(-82)
260 PRINT TAB(0,11),STRING$(80," ")
270 TIME=0
280 PRINT TAB(0,11),CHR$(130);"YOUR
OFF";SPC(17)
290 SOUND 1,-15,45,1
300 PEN=0
310 REPEAT
320 LX=ADVAL(1) DIV 64
330 IF LX<10 OR LX>1000 THEN SOUND
1,-15,100,1:PEN=PEN+1
340 UNTIL INKEY(-99)
350 T=TIME
360 PRINT TAB(0,11);"THATS IT YOUR
SCORE IS :-"
370 PRINT
380 PRINT "TIME ";T/100;" SECONDS"
390 PRINT "NUMBER OF PENALTY POINTS
";PEN
400 SCORE=T+PEN*200
```

```
410 PRINT
420 PRINT "TOTAL SCORE ";SCORE
430 IF SCORE < MINSORE THEN PROCCH
AMP
440 PRINT
450 PRINT"MOVE TO THE STARTING LINE
"
460 PRINT"Press any key when you ge
t there"
470 TIME=0
480 REPEAT
490 UNTIL TIME > 200
500 *FX15,0
510 AX=GET
520 UNTIL FALSE
530 DEF PROCCHAMP
540 PRINT
550 PRINT CHR$(129);"CONGRATULATION
S"
560 PRINT"THAT IS THE BEST SCORE TO
DAY"
570 PRINT"PLEASE LET ME KNOW WHO YO
U ARE"
580 *FX15,0
590 INPUT"TYPE IN YOUR NAME ",NCHAM
P$
600 MINSORE=SCORE
610 ENDPROC
```




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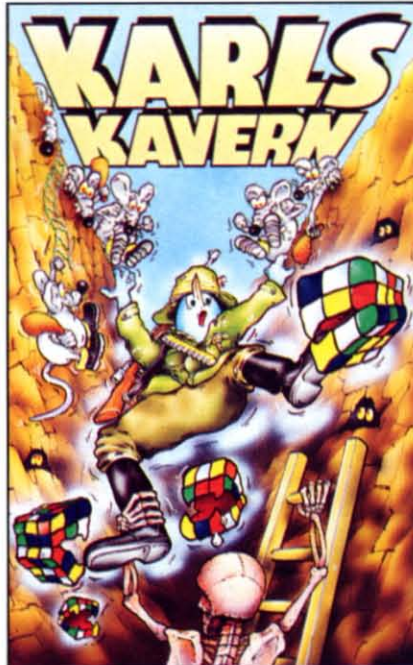
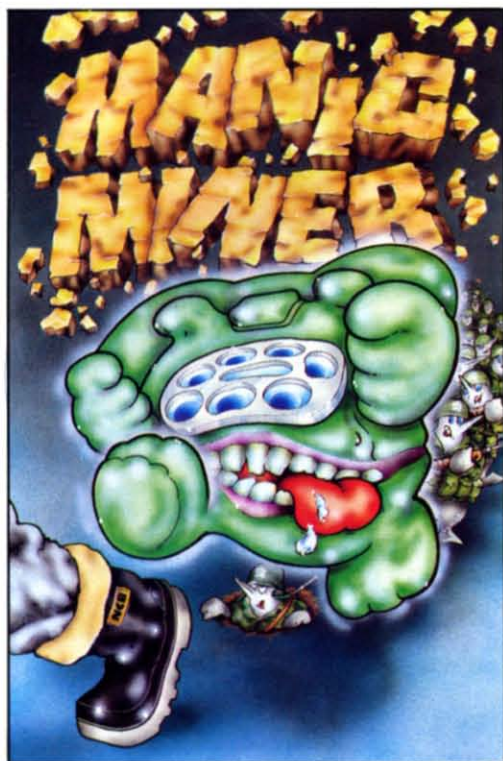
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10am-5pm, Saturday, December 8
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**New Horticultural Hall
Westminster, London SW1**

Number attending MU12

WHILE rummaging through his attic, Miner Bill found his great great grandfather's map to the secret Yellow Feather diamond mine. Unable to resist the temptation of instant wealth he set off into the depths of the mine.

This game recreates his adventures. As Bill, you must collect diamonds while avoiding the poisonous plants and radioactive waste.

The red girders collapse as you walk over them, and you keep bouncing off the cyan trampolines. They're more of a hindrance than a help.

As if that isn't enough there is a limited amount of air per cave, shown as a red bar at the bottom of the screen.

Type the program exactly as it is shown, as there is very little memory left. Watch out especially for spaces on the ends of lines when de-bugging.

Pressing Return on its own will make

Bill jump straight up, but by pressing Z or X (left and right) you may jump in that direction.

Because of the acute shortage of memory, disc users will have to

Dig danger with Miner Bill

By JASON CHOWN

download the program to page &E00.

The program works by having two main REPEAT...UNTIL loops. One is in PROCplay (lines 330-490) which repeats until you clear all the diamonds, or lose a life (signified by ST%).

The other loop repeatedly draws the sheets (PROCns) and calls up PROCplay. This carries on until all the lives are lost.

The collapsing girders work by using three different colours - 9, 10 and 11. When the program detects colour 9 - using PO% - it shifts to colour 10 and moves the girder down one level.

Next time round, it detects colour 10, goes to colour 11 and prints the girder further down. The third time round, it senses colour 11, and prints a space below Bill's feet.

The scrolling message in the instructions is held in MES. The 40

PROCEDURES

PROCAir	Draws air left at the bottom of the screen.
PROCasK	Checks if the high score has been beaten and asks for a new game.
PROCb	Gives a bonus of all the air left after a sheet has been completed.
PROCc	Displays "Enter" and the level you are about to enter.
PROCc	Checks for trampolines, poisonous plants, radioactive waste, unsafe girders, the lever on level four, diamonds, and whether or not you have fallen.
PROCc	Scrolls the screen left when you die.
PROCon()	Decides where to place the conveyor belt bit by bit, and then calls up PROCp() to print each one.
PROCd	Moves your man down.
PROCd	Dimensions the arrays and calls up PROCdefchars.
PROCdefchars	Defines characters, sets flash rates, key repeat rates and the message in the instructions.
PROCDt	Plays the tune when you die.
PROCI	Inputs the players name when he/she beats the high score.
PROCI	Prints the man using GCOL 3, thus can be used to either draw or erase the image.
PROCI	Displays the instructions.
PROCI	Exclusive ors the array CO%() which contains the default colours to achieve the effects in the Hot House and the Ice Chamber.
PROCI	Routine to jump, fall or bounce the man.
PROCI	Moves man left.
PROCladder()	Draws the ladder, the parameters stating the X,Y and height of it.
PROCI	Resets the score, position of Bill, sheet number, lives and air.
PROCI	Draws the appropriate sheet.
PROCI	VDU 19s all colours to 0 (black).
PROCI	VDU 19s all colours to the array CO%().
PROCI	Draws one chunk of conveyor belt, the position of which is decided in PROCcon().
PROCI	Plays until you die or clear the sheet.
PROCI	Prints the diamonds.
PROCI	Moves your man right.
PROCI	Slides the new screen on.
PROCI	Called when you lose a life.
PROCI	Draws stairs at the position of the parameters.
PROCI	Plays the starting tune.
PROCI	Moves your man up.

CONTROLS

Z	Left	Q/S	Sound off/on
X	Right		
*	Up	P/R	Pause/restart
?	Down		
Return	Jump		

spaces at the start make the words come on from the right-hand side of the screen.

The scrolling effect is caused by using MID\$ repeatedly, with T% counting from one to the length of MES.

This program was written on Basic I, OS 1.2, but should work on all Basics and operating systems.

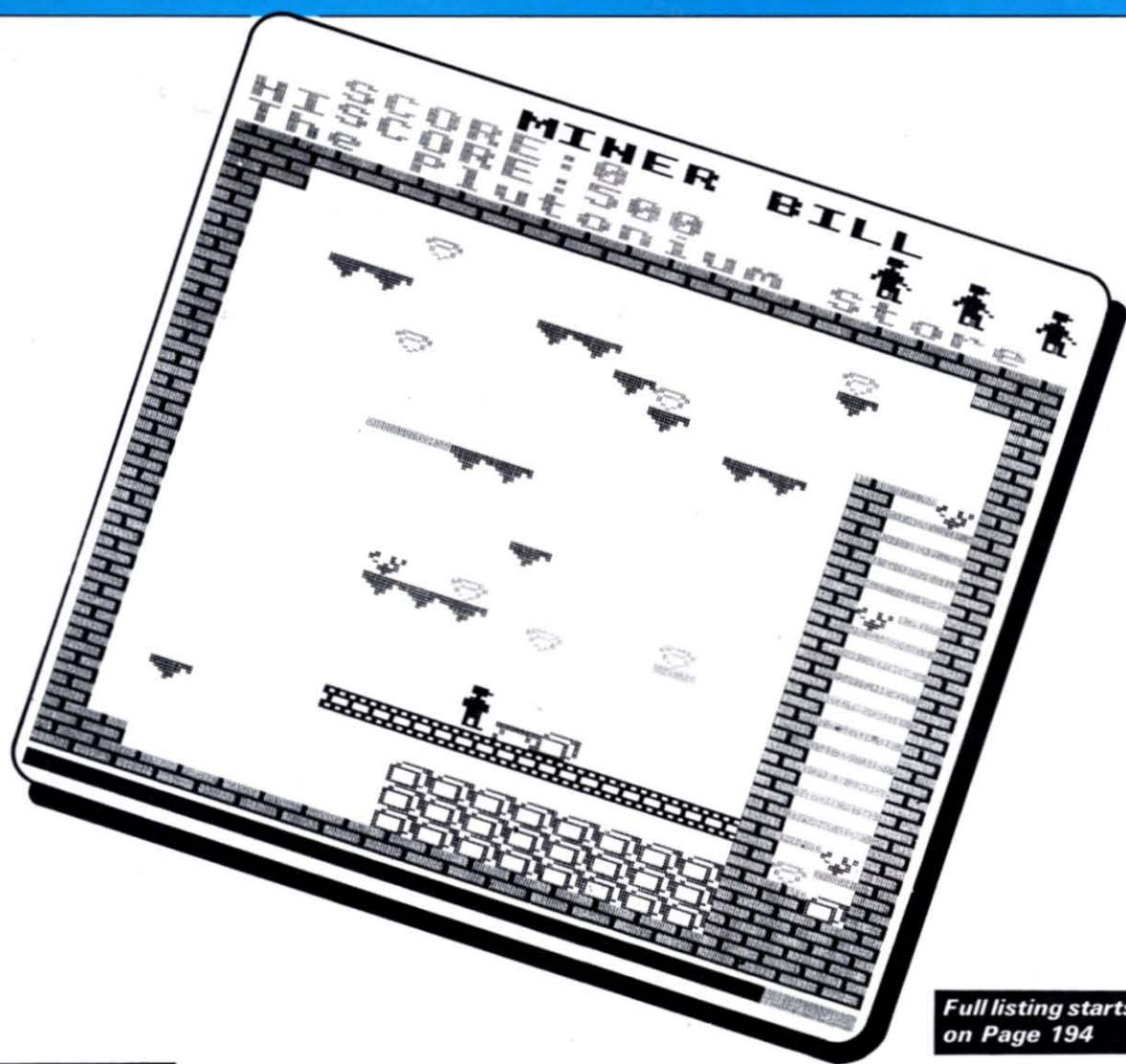
It should also work on the Electron. But apart from being slower, the scrolling in Mode 2 and the way the screen comes on for each sheet is created by the Cathode Ray Tube Controller (CRTC), sadly missing on the Electron.

This is accessed thus:

?&FE00=register

?&FE01=value

This is performed in PROCcl and PROCsl.



Full listing starts
on Page 194

VARIABLES

A% Air left.	R% Length of platform, used in PROCns.	Y2% PROCp(). Vertical position used in PROCp().
B% Used in PROCb.	S% Counter in PROCj().	Z% Key pressed in PROCinstr.
C% Counter.	SA% Starting value of air for each sheet. This is gradually decremented to make it harder.	AS Key pressed in PROCinstr and PROCplay.
DI% Indicates direction of conveyor belt.	SC% Current score.	CS CHR\$131 - used in PROCinstr.
F% Counter.	SH% Current sheet.	HIS Highest scorer's name.
G% Used as 'X' position in PROCns.	ST% Status: 1-10 Number of diamonds left. 0 Sheet finished. -1 Dead.	MES Message scrolled across in PROCinstr.
H% Used as 'Y' position in PROCns.	T% Miscellaneous loops.	A Delay in PROCsplat.
HI% Highest score.	X% Horizontal position of Bill. (Text form).	G Delay in PROCcd.
LI% The number of lives left.	Y% Vertical position of Bill. (Text form).	X Loop in PROCsl.
M% Used in PROCj() and is set when Bill is moved left or right.	X1% Horizontal position of Bill. (Graphics form).	C%(1,1) Holds the character for both of the man's position.
N% Loop in PROCTune.	Y1% Vertical position of Bill. (Graphics form).	CO%(15) Holds the colours displayed in PROCon. This is manipulated in PROCinv() to create negative surroundings.
OS% Counter in PROCj().	X2% Horizontal position used in PROCp().	SS(4) Holds the name of each sheet.
PO% Colour of point beneath Bill's feet.		
P% Pitch in PROCTune and PROCdt. Also used in PROCns.		
Q% Used in PROCns.		

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ROM/RAM board Altair Electronics

THE number and variety of ROM extension boards available for the BBC Micro is growing almost daily.

There is no doubt that it is likely to be the first add on many BBC owners consider, because if you have a DFS, a wordprocessor and a toolkit ROM you have no room left on the main board at all.

This means that the alternative to owning a ROM board is to keep plugging the chips in and out of the main board, an action likely to have dire consequences sooner or later.

So what is special about this board and why has it been released to compete with all the others already available?

The answer lies in a little blue package on the extreme right hand side. This board comes with a battery backed RAM system in addition to the normal ROM facilities.

There have been many boards which allow this facility but very few where the battery and the switchable charging circuit are supplied as standard.

Another feature of this RAM system is that it is write protected and cannot be overwritten accidentally.

This is likely to be of great value to the machine code programmer as there are some programs which will write over any RAM located above &8000, as I know to my cost.

The board is fairly easy to fit and comes with a manual, provisional in my case, detailing all the links that need to be removed and the connections to be made.

There is no soldering involved. All the connections are made by pushing wires onto link pins or using IC sockets.

You need to bend four of the power leads to make room for the board. This should be done with great care as the terminals are easy to break. I know this from personal experience too!

The most difficult and risky part of the operation is the removal of the 6502 CPU chip and the 8271 FDC chip if you have a disc interface. As both of these are 40 pin chips it is not the easiest of operations to remove them from the main board, but having done so they fit into the extension board very easily.

The manual, while clear in most aspects, could have had a diagram to make the fitting operation a little easier.

Once the board is fitted all the leads and the two chips are inserted before power up. If all is well the normal beep is

The secret is in the little blue package ...

heard and you can switch off again and fit your sideways ROM and RAM chips.

These are very easy to insert but extremely difficult to remove. Whether this is a design feature or a design fault is difficult to say, but don't put chips on the board temporarily. Only insert them if you intend to leave them for some time.

The RAM option requires two 8k 6264 chips of either normal or low power rating. These are mapped onto socket 0 and can be latched for write and read operations using a *FX call.

There is an optional LED which glows red if the RAM is write protected and green if write enabled. This is very simple to use and almost foolproof in operation.

Overall this is one of the best built and designed boards I have ever seen but it still has a few small problems. It is

located over a large part of the main board including some of the RAM, but its height is likely to minimise any overheating problems.

I cannot see how a double density disc controller board could be fitted. It would need to go on top of the board and is likely to mean that the lid won't fit.

There is too little support at the back of the board where the chips fit. This means that when you press a chip home the 40 pin sockets are likely to come free at the front.

It makes chip insertion a two or even three handed operation.

If RAM is a requirement in a ROM board for your system, then this is likely to be just what you are looking for. As there are a number of far worse products available, give this one a good look.

Dave Carlos

Pay your money, and make your RX/FX choice



Epson matrix printers. Left, the RX80 and right the FX80.

RX/FX printers Epson

MANY people buying a matrix printer will look towards the range produced by Epson. As the owner of an RX80F/T with access to an FX80 at work I thought it would be interesting to compare them.

Both models arrive well packed with mains lead, ribbon cartridge and handbook. All that is needed for them to

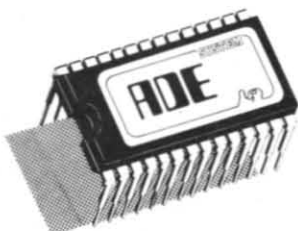
operate with the BBC Micro is a mains plug, paper and a 26-way ribbon cable with IDC and D-type connectors.

Inside each machine are two rows of DIL switches providing the startup options. As the BBC doesn't send a line feed with a carriage return, one switch must be set so that the printer generates its own line feed. Alternatively use *FX6.0.

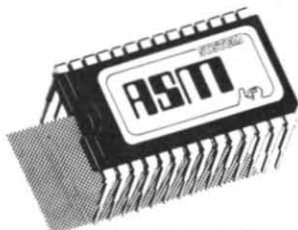
Access to the DIL switches is via a small cover on the FX, whereas the RX

SYSTEM SOFTWARE

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The ASSEMBLER features macros with library facilities; nestable conditional assembly; flexible listing options (with or without macro expansion); hex, decimal, binary and ASCII data formats; dummy section; full range of arithmetic and logical operators; symbol table sort and dump; file chaining and 29 powerful pseudo ops. Source and object files are kept on disc so there is no limit on program size or location.

The EDITOR is designed with the programmer in mind for writing both programs and documentation. The editor includes a very powerful command language (including macros) that enables much editing to be done on a semi-automatic basis. It features full screen editing and deferred edit modes; no limit to document size; edit with backup facilities and a versatile text formatter.

The DEBUGGER is instantly accessible for inspecting, modifying and disassembling machine code programs. Features include full 64 byte display in hex, ASCII and disassembled format; registers; stack; single step; breakpoints; memory search and much more.

Price £60 inc vat. Please specify 40 or 80T utility disc.

ASM provides all the superb features of the ADE macro assembler on its own ROM.

The program source file may be written using any editor (even Wordwise or View!). Complete with reference manual and utility/macro library disc. Use the assembler that professional software writers use.

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SPY2 is a combined front panel debugging monitor and disassembler with extensive disc utilities all on one ROM. SPY2 is instantly accessible to the programmer for inspecting, modifying, debugging and disassembling machine code programs. SPY2 also features a relocater and program trace facilities. SPY2 will access any ROM either in the sideways ROM sockets or on an extension board. ROM memory may be displayed, single-stepped through or disassembled.

SPY2 includes a set of powerful disc recovery commands for interrogating, editing and retrieving data stored on a floppy disc. SPY2 also includes a disc formatter as well as a non-destructive single track reformatter.

In all SPY2 has a comprehensive set of 23 utility commands. These are supported by an excellent Reference Manual.

The SPY2 front panel encompasses all the superb, easy-to-use facilities of the renowned SPY debugging monitor PLUS additional commands for toggling and finding breakpoints; relocating machine code programs; single stepping through subroutines in one go and facilities for accessing the front panel from programs in RAM or ROM with breakpoints, OSBYTE or CTR-F.

SPY2 features a versatile disassembler with hex dump, full and intelligent disassembly. This identifies data areas in the program; these being displayed as a hex/ASCII dump. Operating system calls are labelled creating very readable code. The powerful trace facilities enable program instructions and register contents to be traced to printer whilst the program is running. Indispensable for graphics programs as they can be stepped through whilst observing the effects on the screen.

SPY2 features a disc sector editor displaying the contents of a whole sector; disc search facilities for finding byte patterns or strings and free disc space. Files may be recovered by creating a directory entry with all the data concerning the deleted file. Directory entries can be easily amended using the *AMEND command. The *FORMAT command formats discs with any number of tracks. A verify command checks discs. The *REFORMAT command is extremely useful for recovering information from a bad track, reformatting it and restoring the data. Commands are included for loading files at \$1900 and automatically downloading (and running) them.

The most comprehensive of all debugging/disc utility ROMs.

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From Page 119

requires the upper half of the case to be removed.

While both printers accept paper into a combined friction and tractor feed, loading with pinfeed paper is much easier on the RX due to the flip back tractor feed wheels.

Also whereas the FX needs an additional situpon tractor unit to accept pinfeed paper less than 9.5 inches wide the RX mechanism will adjust between four and 10 inches. The FX allows paper to be torn off very close to the print head.

Common to both RX and FX are the enlarged, emphasised, condensed, double-strike, underlined, italic, unidirectional, superscript and subscript modes, most of which are available in pica and elite sizes.

Three preset and two variable – in increments of 72nds and 216ths of an inch – line spacings, right and left margin settings, perforation skip and form length setting are identical, while horizontal and vertical tabulation are similar in result although the methods of setting are different.

It is possible to sound the buzzer, enable and disable the paper end detector, delete the last character, backspace, select half speed and reinitialise in both models.

The FX80 also allows the user to select proportional spacing, cancel the last line, reverse feed paper and set combined printing modes by sending only three Ascii characters.

Nine international character sets on the FX and 11 on the RX allow most European languages to be printed.

A major feature of the FX80 is the ability to program user-defined characters. The RX has available graphics characters matching those of the Epson HX-20 micro.

Bit image graphics printing is available in six eight-pin modes on both machines but the FX also has an additional plotter graphics mode and two nine-pin modes.

The two final differences between the two types lie in the speed and price. Although the RX80 print speed is 100 cps against the FX80's 160 cps, the RX only took 75 seconds to print this article and the FX 55 seconds.

For £90-£115 more the FX80 gives you programmable characters, proportional spacing, faster speed and extra bit graphics modes, all at the expense of poorer paper handling.

Ian Whitmore

If you can't find your favourite – then why not do-it-yourself?

Eprom programmer Softlife

IF you are like me you will probably find nobody has yet produced an eprom that contains your favourite utility or game program.

If this is the case then why not do-it-yourself? Too technical – that was my first thought until I saw the Softlife eprom programmer.

I had never used one before, yet within 30 minutes of receiving it I had installed seven of my favourite machine code and basic utilities into one 8k eprom.

The Softlife is very neat and tidy, an 11 x 6 x 3cm box which is interfaced to the micro by a single ribbon cable inserted into the user port.

It is capable of programming the two most popular eproms used with the BBC, the 8k 2764 and the 16k 27128. No external power supply is required and the unit can be used with both tape and disc based systems.

The Softlife comes with an 8k eprom containing the required software. The first job is to read this software from the eprom and save it. The instructions to do this are clear and easy to follow.

After this the eprom can be erased – possibly by a friendly dealer – and then programmed by the user.

Each facility is given a brief but informative description in the slim booklet supplied. This also provides a listing of the software, allowing the more demanding user to tailor it to his own requirements.

When buying such a device the quality of the hardware is not the only consideration. If the software does not fully meet user expectations then he is faced with two options – persevere with the software and its limitations, or adapt the software to meet his own needs.

The latter will probably mean delving into the occult world of machine code. Fortunately the software supplied with the Softlife is easy to use, tolerant of an

inexperienced user's bunglings, and caters for the requirements of the large majority of users.

The program is menu driven and provides all the usual facilities expected of an eprom programmer, such as write and read an eprom, verify an eprom against its source file, check whether an eprom is blank and so on.

However the facility that could prove to be a selling point is the ability to take the user's Basic and machine code programs and convert them into a form which can then be installed into an eprom.

When using this ROM format facility the user is prompted for the filename of the program to be converted. This is repeated until the message "file too long ..." is displayed, at which point the user knows that he cannot program any more files into the size of eprom being used. Finally the user is asked to insert a blank eprom into the special zero insertion force socket and programming begins.

The time taken to program the eprom is displayed constantly at the bottom of the screen during programming. This was approximately six minutes for an 8k eprom, not stunning but adequate for the hobbyist.

Once the eprom has been inserted into one of the BBC's sideways ROM sockets programs can be used via the ROM filing system.

This can provide the user of a tape based system with quite a speedy alternative for loading his most frequently used programs.

By merely typing *ROM the user can run the programs present in the eprom as though it was a tape or disc filing system using all of the normal commands available.

The Softlife eprom programmer is inexpensive, easy to use, compact, and possesses a comprehensive range of facilities. I have no reservations in recommending it to anyone wanting an eprom programmer.

Jon Revis

Ultra Drive deserves consideration

Ultra Drive Icon

The standard cassette filing system is not the easiest filing system to use. It is slow, can be unreliable and lacks a number of the useful facilities of the disc filing system.

It is also all too easy to make mistakes. How often have you accidentally overwritten a file or forgotten to press the Record button as well as Play when saving a program?

The Ultra Drive is a new tape based system which endeavours to get around most of the problems. It is not based on a continuous loop of tape like a stringy floppy or cartridge but on a mini-cassette.

These are very much smaller than the standard compact cassette, making storage much less of a problem, but they are more expensive.

Fitting presents no difficulty. Simply connect the drive unit to the micro by a cable into the auxiliary power socket and by some ribbon cable into the user port.

Then push in the eprom containing the software into a paged ROM socket and switch on.

The box that houses the drive is about 95 x 90 x 110 mms.

The only control on the unit is a catch to open the cassette drawer. All other control is by software.

For instance, instead of pressing a rewind button as you would expect on a normal cassette unit, type in *REWIND instead. It will stop when the end of the tape is reached.

Other differences from the standard tape system are seen immediately if a *CAT is done on the utility tape. See Figure 1.

Each file name is preceded by a letter.

Pressing this letter along with Ctrl allows a Basic program to be chained.

Machine code programs cannot auto-run in the same way. They are accessed by typing in * followed by the file name just like the DFS.

The length of each file is given as well as the number of blocks free for use in that section of tape.

The letter following Ultra indicates the action taken with a file called !BOOT when Shift/Break is pressed. C shows that it is to be chained.

The Ultra filing system can be used at two levels, depending on the number of files open at the same time. The simplest level (selected by pressing U and Break, or *ULTRAU) leaves PAGE where it is (&E00 on a basic machine) and allows one file to be open at a time.

The complex level (selected by pressing V and Break, or *ULTRA) needs to have PAGE moved – up to &1600 on the basic machine – and allows two drives and up to five files to be open at the same time.

Most of the Basic filing system commands will work as explained in the User Guide including PTR# which means that relative – random access – files can be written.

Some of the commands have extra features. For example, a data file can be opened for appending extra data, and if a file name already exists it will not overwrite it without asking first.

There are extra * commands associated with the system. These are:

*SWAP – a formatted tape has two sections on it called loops. This command switches between the two.

*KILL – deletes all files on the

current loop.

The package includes a utilities cassette, a necessity as it includes a formatting program without which other cassettes cannot be prepared for use.

Many of the other utilities are aimed at giving more DFS-like commands.

*INFO gives more information about a named file or files. For example, *INFO !BOOT gives:

```
File: !BOOT
Length: 40A
Load Add: FFFF0E00
Exec Add: FFFF8023
Start Blk: 1
Allocated: 5
```

*DELETE as its name suggests can delete one file or a number of files, asking permission each time, rather like the DFS *WIPE.

*RENAME changes the file name.

*ACCESS is used for locking or unlocking a file.

*RECOUP attempts to recover a file that has been accidentally deleted.

*TAPE-ULT transfers files from standard cassette to the Ultra system. A version to transfer locked files is promised soon.

The tape also includes a text file which gives extra information not in the manual.

One irritation is the cryptic one letter error messages. Although the manual lists the meaning of these, it does not detail the error numbers.

The manual is small and short, conveying only the basic operating instructions.

It does everything much more quickly and in a more organised fashion than the Acorn cassette filing system, but still considerably slower than a DFS.

It lacks some of the commands and calls you'd expect from a disc system, such as no OSGBPB calls.

At a cost only about double that of an ordinary cassette recorder it certainly deserves consideration for the extra facilities it gives.

Jim Notman

Ultra C Drive 0 50 Free

A) !BOOT	5
C) ADDENDA	2
E) FORM	2
G) RECOUP	1
I) RENAME	3
K) TEXT	50

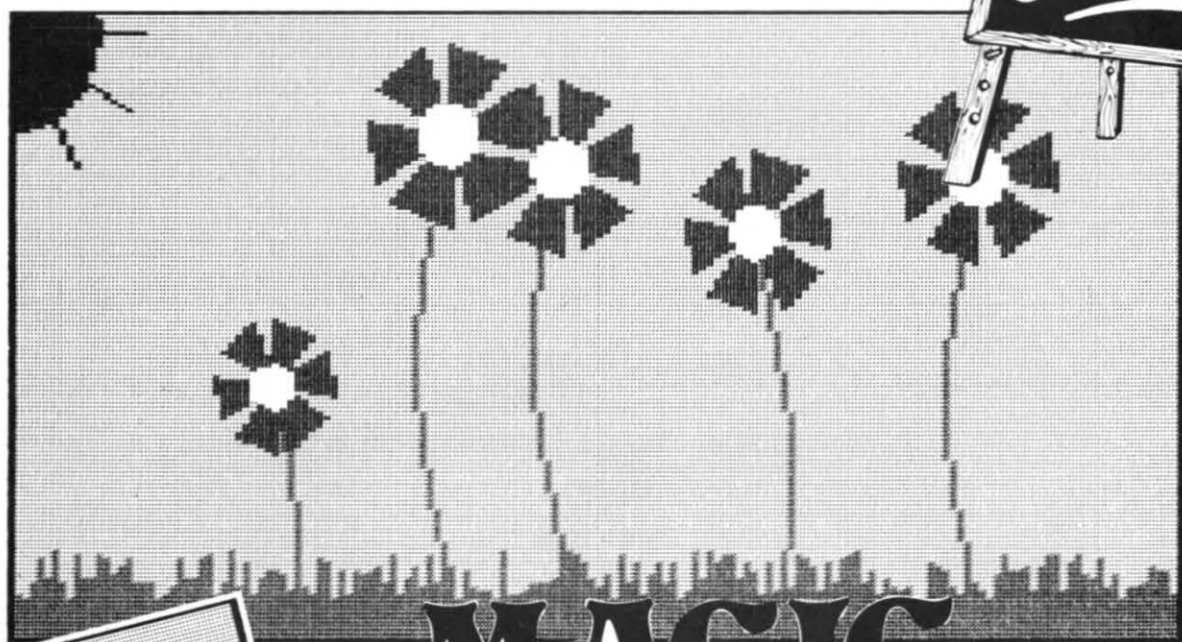
IKON-C Loop 1

B) ACCESS	1
D) DELETE	2
F) INFO	2
H) RELOC	1
J) TAPE-ULT	3
L) UTILCPY	3

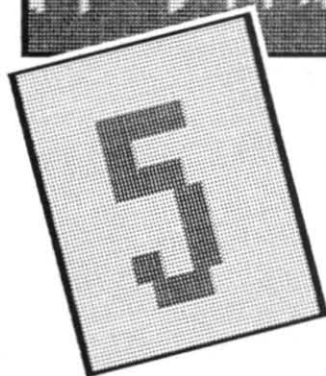
Figure 1: Utility tape

**Teach infants shape recognition
with ROLAND WADDILOVE**

**Classroom
Corner**



MAGIC GARDEN



PROCEDURES

- PROCassemble** Assemble the machine code for the large letters routine at &900.
- PROCinitialise** Switch off the cursor keys, auto repeat and Esc. Define *KEY 10 - break. Define the characters for Micro/Electron User and envelopes.
- PROCinstructions** Print the big title and instructions for the parent or teacher.
- PROCboxes** Draw the two boxes for the garden and question, print Micro/Electron User.
- PROCscreen** Set up the graphics window for the garden and clear it. Draw the grass and the sun. Constantly check the sound buffer for space, if there is enough read the next note of the tune.
- PROCcharacter** Set up the graphics window for the question, choose a random character and draw it. Wait until the right key is pressed.
- PROCflower** Draw a flower at a random position, size depends on the height which is also random. The flower is drawn using triangles and the formula for a circle.
- PROctune** Plays the tune.

MAGIC Garden provides infants and their parents with an entertaining way of practising shape recognition — one of the fundamental skills of reading.

It also teaches the keyboard layout, knowledge which is becoming increasingly vital in our computer-based environment.

Initially the parent or teacher is offered a menu from which to choose the subject: upper or lower case letters, or numbers.

Whichever is chosen, a large character is drawn on screen and the child must match it by pressing the appropriate key on the keyboard.

Of course, the legends on the keyboard are all upper-case, which is a shame in a micro which so heavily dominates the educational scene.

While it may seem a drawback that the child has to press the upper case B key to match a lower case b on the screen, it only teaches him what he'll need for future use of the keyboard.

Motivation is provided in the form of a magic garden that grows on the screen as each match is correctly made.

DEPT. CG1,
18 HAZELMERE RD,
STEVENAGE, HERTS
SG2 8RX.

QUAL - SOFT

STEV (0438) 721936

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QUAL-SOFT comments: In 1982/83 it was only necessary to throw together a few M/C code routines, record them on a cassette, produce a flashy cassette insert, and it sold. But as we approach 1985, BBC users have become much more discriminating in their choice of software. Customers demand something more satisfying than a few hours of high adrenaline action. They demand, not hours, but tens of hours, even a hundred hours plus, of "playability". They demand that the program challenges their intellect and not just their reflexes. They demand QUALITY games. For the 84/85 season; for these customers, QUAL-SOFT is proud to offer these games:

"DIVISION ONE '85" and "SOCCER SUPREMO" are direct descendants of the 1983 game "LEAGUE DIVISION ONE", but they are a significant advance on what was described as "by far the best game for the BBC Micro". They are soccer management SIMULATIONS! Soccer management is about ASSESSMENT; assessment of the opposition strengths, of your players and their skills, of the effectiveness of the teams you assemble, of the value of transfer listed players, of the potential of your own youngsters. Soccer management is about EXPERIMENTATION; experimentation with players, with blends of players, with team formations, with tactical ploys. QUAL-SOFT's unique soccer match simulation, with tackles, passes, shots, saves etc. all simulated within your micro, and the results displayed in graphical form on your screen, allows ASSESSMENT and EXPERIMENTATION to be carried out. **The result is a 2ND GENERATION soccer management SIMULATION, not an exercise in mental arithmetic!!!**

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(all OS)

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TAPE £9.95
DISC £12.95
(all inc.)

This is an uncompromising strategy/tactics simulation, it will test to the full your knowledge of the game and your ability to use it to build a winning side. As described above, your ability to experiment and judge the results are paramount. Injuries, suspensions, long term "form" changes, short term "form" fluctuations, will all conspire to confuse and defeat you. You will also meet the problems of financial limitations as you choose between the 33 players available to you. You have a contract for 5 seasons, which will be terminated if your side is relegated. This game is the supreme test of your managerial skills, short of the real thing.

ELECTRON
BBC 'B' (all OS)

SOCCER SUPREMO

TAPE £9.95
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Soccer Supremo has been improved over the original game in the direction of a much more realistic "3D", 22 MAN, FULL PITCH match simulation for each of your games. The game is still a significant challenge to your managerial skills, but with greater emphasis on enjoyment and entertainment. But with 30 players to choose from, restricted finances, and just a 5 season contract, the 1st Division Championship is not an easy task.

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BBC 'B'
(all OS)

PORTFOLIO

TAPE £9.95
DISC £12.95
(all inc.)

The most popular indoor games have always been multi-player board games, and yet designers have insisted on producing single player "me and my micro" computer games. In the USA the balance has already shifted away from the "arcade mentality" towards multi-player programs. PORTFOLIO is an investment game for 1-4 players, or teams of players. Each player/team begins with £1,000 and invests his money in a variety of companies against a background of continually changing international, national and commercial news. The news items affect the share values of the companies in a variety of different ways, and the players must shift their money around to maximise their investments; maybe even to become a millionaire.

The game is an ideal family game, or perfect in the classroom with a high pupil/micro ratio. It's suitable for 12 years old and above, though younger do enjoy the game with some help from their friends, and in this game, competitors. For the adult we have made some of our news items somewhat cryptic, occasionally even red herrings, to really make them think about the effect on share values. Because we call it a family game we have tried to see that there is something in it for all members of the family. Teachers can even tailor the news items to suit the capabilities of the pupils.

So why not set your Beeb on the coffee table, connect it to the TV set and play against the rest of the family or your friends on these cold, wet winter nights that are on us. It might even bring back the art of conversation (as against BASIC statements).

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£9.95 ☐ DIVISION ONE '85'	☐ £12.95
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Soccer Supremo: ELECTRON or BBC

Name:
Address:
.....
Card No:

Magic Garden listing

From Page 123

VARIABLES

B%	&900 address of the machine code.
H%	Height of the large characters.
W%	Width of the large characters.
BIG\$	String to be printed.
numbers	Flags to show the type of question.
capitals	
lower_case	
key\$	Key pressed.
chr	Character chosen.
P%	Pitch of the note to be played.
I%	General variable.
R%	Random number.
S%	Size of flower.
X%, Y%	Coordinate of the flower.

```

10 REM * Magic Garden *
20 REM *By R.A.Waddilove*
30 REM *For Micro User *
40 REM *Electron User *
50 ON ERROR GOTO 1230
60 PROCassemble: CLEAR
70 PROCinitialise
80 MODE 1
90 PROCinstructions
100 MODE 2
110 PROCboxes
120 REPEAT
130 PROCscreen
140 FOR flower=1 TO 10
150 PROCcharacter
160 NEXT
170 PROctune
180 UNTIL FALSE
190 END
200 DEF PROCinitialise
210 *FX4,1
220 *FX11,0
230 *FX16,0
240 *FX229,1
250 *KEY10 "OLD:MRUNIM"
260 VDU 23,224,0,0,0,139,217,169,13
7,139,23,225,0,0,0,187,34,35,34,186,2
3,226,0,0,0,184,168,40,168,184
270 VDU 23,227,0,0,0,174,168,174,16
2,238,23,228,0,0,0,238,138,204,138,23
4
280 VDU 23,229,0,0,0,232,136,200,13
6,238,23,230,0,0,0,238,136,200,136,23
8,23,231,0,0,0,238,74,76,74,74,23,232
,0,0,0,233,173,171,169,233

```

```

290 ENVELOPE1,9,1,2,4,100,100,55,12
6,0,0,-126,126,126
300 ENVELOPE2,131,-1,-2,-4,50,20,0,
126,0,0,-126,126,126
310 ENVELOPE3,129,-1,1,0,1,1,0,126,
0,0,-126,126,126
320 ENDPROC
330 DEF PROCinstructions
340 VDU 23,1,0;0;0;0;
350 COLOUR 129:PRINT STRING$(200,"
*)
360 MOVE 240,890:HX=3:WY=2:BIG$="Ma
gic Garden":CALL B%,BIG$
370 COLOUR 128:COLOUR 2:PRINT TAB(0
,8)"A letter or number will be drawn
at the""bottom left hand corner of
the screen.""Pressing the correct
key will make the""flowers grow."
380 COLOUR 3:PRINT""Press...":COL
OUR 2:PRINT""U - for UPPER CASE lett
ers""L - for lower case letters""N
- for numbers"
390 numbers=FALSE:capitals=FALSE:lo
wer_case=FALSE
400 *FX21,0
410 REPEAT key$=CHR$(GET AND &DF)
420 IF key$="U" capitals=TRUE
430 IF key$="L" lower_case=TRUE
440 IF key$="N" numbers=TRUE
450 UNTIL INSTR("ULN",key$)
460 VDU 7:COLOUR 3:PRINT"key$;" se
lected.";
470 TIME=0:REPEAT UNTIL TIME>300:CL
S
480 ENDPROC
490 DEF PROCcharacter
500 VDU 19,8,7;0;26,24,50;50;300;35
0;CLG:GCOL 0,132
510 IF lower_case chr=RND(26)+96
520 IF capitals chr=RND(26)+64
530 IF numbers chr=RND(10)+47
540 GCOL 0,8:HX=7:WY=2
550 IF lower_case MOVE 110,70 ELSE
MOVE 110,60
560 BIG$=CHR$(chr):CALL B%,BIG$
570 IF NOT numbers BIG$=CHR$(chr OR
&20)+CHR$(chr AND &DF)
580 REPEAT key$=GET$
590 *FX21,0
600 IF INSTR(BIG$,key$)<1 SOUND &11
,-15,0,10:VDU 19,8,0;0;TIME=0:REPEAT
UNTIL TIME>200:VDU 19,8,7;0;
610 UNTIL INSTR(BIG$,key$)
620 CLG:PROCflower
630 ENDPROC
640 DEF PROCboxes
650 VDU 23,1,0;0;0;0;
660 MOVE 0,400:DRAW 1279,400:DRAW 1
279,1023:DRAW 0,1023:DRAW 0,400:MOVE

```

```

42,46:DRAW 42,354:DRAW 308,354:DRAW 3
08,46:DRAW 42,46
670 COLOUR 3:PRINT TAB(11,23);CHR#2
24;CHR#225;CHR#226;CHR#227;CHR#228;TA
B(10,27);CHR#229;CHR#230;CHR#231;CHR#
232;CHR#32;CHR#227;CHR#228
680 ENDPROC
690 DEF PROCscreen
700 RESTORE 1130
710 REPEAT READ P$:SOUND 1,3,P%,4:U
NTIL ADVAL(-6)=0
720 VDU 26,24,8;404;1271;1019;
730 GCOL 0,132:CLG:GCOL 0,2
740 FOR IX=8 TO 1272 STEP 8
750 IF ADVAL(-6) READ P$:SOUND1,3,P
%,4
760 MOVE IX,400:DRAW IX,440+RND(50)
770 NEXT
780 GCOL 0,3:VDU 29,0;1000;:MOVE 0,
SX
790 FOR angle=60 TO 180 STEP 30
800 MOVE 0,0:PLOT 85,100+SIN(RAD an
gle),100+COS(RAD angle)
810 IF ADVAL(-6)>0 READ P$:SOUND1,3
,P%,4
820 NEXT
830 REPEAT READ P%
840 IF P% SOUND1,3,P%,4
850 UNTIL P%=0
860 MOVE 75,-129:DRAW 0,0:DRAW 129,
-75:MOVE 0,0:DRAW 150,0
870 SOUND 1,3,104,40
880 ENDPROC
890 DEF PROCflower
900 VDU 26:GCOL 0,2:angle=RND(180):
XX=RND(880)+200:MOVE XX+20+SIN(RAD an
gle),440:SOUND 1,1,0,255
910 FOR YZ=444 TO 600+RND(300) STEP
8
920 TIME=0:DRAW XX+20+SIN(RAD angle
),YZ:angle=(angle+5)MOD 360:REPEAT UN
TIL TIME>5
930 NEXT
940 RX=RND(3)
950 IF RX=1 GCOL 0,RX ELSE GCOL 0,3
+RX
960 XX=XX+20*SIN(RAD angle):VDU 29,
XX,YZ;SX=YZ DIV 10:MOVE 0,SX
970 FOR angle=0 TO 360 STEP 60
980 TIME=0:SOUND &11,-15,angle/2,1:
MOVE 0,0:MOVE SX*SIN(RADangle),SX*COS
(RADangle):PLOT 85,SX*SIN(RAD(angle+4
0)),SX*COS(RAD(angle+40)):REPEAT UNTI
L TIME>5
990 NEXT
1000 GCOL 0,0:SX=YZ DIV 30:MOVE 0,SX
1010 FOR angle=20 TO 360 STEP 20

```


From Page 125

```

1020 TIME=0:MOVE 0,0:PLOT B5,SX*SIN(
RADangle),SX*COS(RADangle):SOUND &11,
-15,angle/4,1:REPEAT UNTIL TIME>5
1030 NEXT
1040 SOUND 1,2,100,50
1050 ENDPROC
1060 DEF PROCtune
1070 RESTORE 1130
1080 FOR IX=1 TO 56
1090 READ pitch:SOUND 1,3,pitch,4
1100 NEXT
1110 SOUND 1,-15,104,20
1120 ENDPROC
1130 DATA 56,116,112,116,104,116,96,
116,88,116,84,116,76,116,68,116,48,11
2,104,112,96,112,88,112,84,112,76,112
,68,112,64,112,48,104,96,104,88,104,8
4,104,76,104,68,104,64,104,56,104,64,
104,100,92,100,104,92,100,0
1140 DEF PROCassemble
1150 char=&B7:block=&B5:counter=&B5:
limit=&B6:string=&B3:length=&B2:adre
ss=&B0:x=&B7E:y=&B7C:byte=&B7B:height=&B7

```

```

A:width=&B79:mode=&B78:data=&B70:ldata=&
02080402:data!4=&01010804:Hx=&420:Wx=
&45C:Xx=&310:Yx=&312:oswrch=&120E AND
&FFFF
1160 osword=&120C AND &FFFF:parame
r=&600:Bx=&900:FOR pass=0 TO 2 STEP 2
:Px=Bx:(OPT pass:LDX &355:LDA data,X:
STA mode:LDA parameter:BEQ error:LDA
parameter+1:STA block:LDA parameter+2
:STA block+1:LDY #0:LDA (block),Y:STA
string:INY
1170 LDA (block),Y:STA string+1:INY:
INY:LDA (block),Y:BEQ error:STA limit
:LDA #0:STA counter:loop5 LDY counte
r:LDA (string),Y:STA char:LDA #10:LDX
#char:LDY #0:JSR osword:JSR print:IN
C counter:LDA counter:CMP limit:BCC 1
oop5:RTS
1180 .error BRK:1?Px=4:Px=Px+1:$Px="
Big error!":Px=Px+LEN($Px):(OPT pass:
BRK:.print LDA Yx:STA y:LDA Yx+1:STA
y+1:LDA Xx:STA x:LDA Xx+1:STA x+1:LDY
#7:.loop1 LDA Hx:BEQ error:STA heigh
t:.loop2 LDA x:STA Xx:LDA x+1:STA Xx+
1:LDA char+1,Y

```

```

1190 STA byte:LDA Yx:CLC:ADC #4:STA
Yx
1200 LDA Yx+1:ADC #0:STA Yx+1:LDX #0
:.here LDA Wx:BEQ error:STA width:ASL
byte:PHP:BCC next:.loop3 JSR plot:n
ext LDA Xx:CLC:ADC mode:STA Xx:LDA Xx
+1:ADC #0:STA Xx+1:DEC width:BEQ carr
yon:PLP:PHP:BCC next:BCC loop3:.carry
on PLP:DEX
1210 BNE here:DEC height:BNE loop2:D
EY:BPL loop1:LDA y:STA Yx:LDA y+1:STA
Yx+1:RTS:.plot LDA #25:JSR oswrch:LD
A #69:JSR oswrch:LDA Xx:JSR oswrch:LD
A Xx+1:JSR oswrch:LDA Yx:JSR oswrch:L
DA Yx+1:JMP oswrch:J:NEXT
1220 ENDPROC
1230 REM ** error **
1240 MODE 6:VDU 14:#FX12,0
1250 REPORT:#FX4,0
1260 PRINT" at line ":ERL:#FX229,0

```

This listing is included in this month's cassette tape offer. See order form on Page 237.

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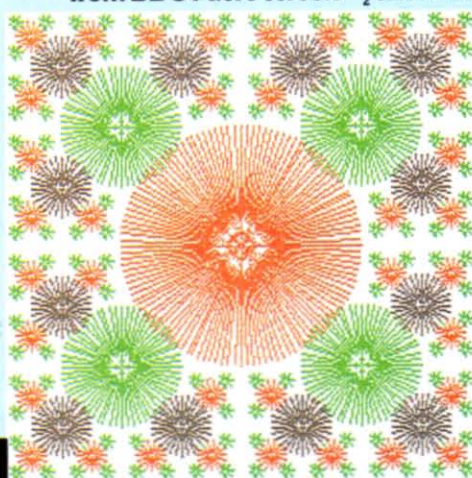
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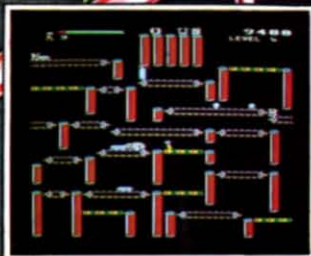
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0009	D#1	1	0	G#0
0010	E	1	1	A#0
0011	F	1	1	B#0
0012	G	1	1	C#1
0013	A	1	1	D#1
0014	B	1	1	E
0015	C	1	1	F
0016	D	1	1	G
0017	E	1	1	A
0018	F	1	1	B
0019	G	1	1	C
0020	A	1	1	D
0021	B	1	1	E
0022	C	1	1	F
0023	D	1	1	G

BBC & Electron

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8019	6F	72	6E	6A	00	00	00	00 orn
8021	00	00	A9	84	20	F4	FF	06
8029	06	84	07	A9	83	20	F4	FF
8031	84	18	A2	00	86	1F	8E	02
8039	04	8E	03	04	CA	86	23	A2
8041	0A	8E	00	04	CA	8E	01	04
8049	A9	01	25	11	05	00	05	05
8051	05	0F	05	10	00	0C	A9	41
8059	85	0D	A9	52	85	0E	A9	57
8061	85	0F	A9	02	80	02	A9	57
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- Full dual screen operation.
- Full screen memory editor, input in hex, Ascii or as assembler instructions.
- Search for hex, or Ascii string, including wildcards.
- Move memory block.
- Verify that two blocks are the same.
- Relocate code to run at another location.
- Fill memory with series of hex bytes or Ascii string.
- Execute all * commands.
- Single step with skip option.
- Up to 10 breakpoints which may even be set in Rom.
- Conditional breakpoints... e.g. Break if register X=5.
- User definable work area.

Note: The Electron version does not feature dual screens.

COMMAND SUMMARY

*PLAY	Calls the variable speed, interrupt driven playback routine.
*DISP	Mode 7 display of tune playing.
*TEMPO	Alter tempo.
*KEYB	Use BBC keyboard as a piano keyboard.
*SCORE	Call up full screen music editor.
EDITOR SUB-COMMANDS:	
MODE	Change from editing a single channel to editing all channels consecutively.
GO	Move editor to any note in score.
PLAY	Enable single stepping of music.
OCTV	Change octave of any channel.
ENVL	Change envelope of any channel.
LOAD	Load previously created music.
SAVE	Save edited score to disc or cassette.
KEY	Toggle note entry between note name and keyboard position.
*ENVLP	Sound envelope editor.
*FLUTE,	*SYNTH... etc. ten predefined envelopes.
*EXPLODE,	*ZAP... etc. ten predefined effects.
*TRANS	Transpose up or down by a number of semitones.
*MONOC	Disable colour output for monochrome screens.

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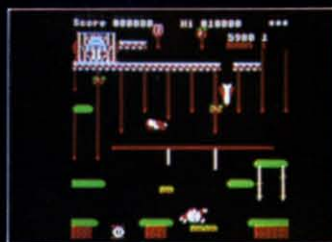


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ON Page 42 of the BBC Micro User Guide you will find a program that can solve quadratic equations of the form:

$$A \times x^2 + B \times x + C = 0$$

A very simple adventure puzzle could have the player enter a "square" room and present him with a quadratic to solve. The beauty of this puzzle is that the program does not contain the answer but only the three, randomly generated values of A, B and C plus a simple test such as:

```
10 INPUT X:IF A*X^2 + B*X+C <> 0 THEN 10
```

Too easy? But later on the player enters a "cubical" room and is now faced with four variables – A, B, C and D. Obviously the program is waiting for him to solve a cubic equation but, to paraphrase Michael Caine, "not a lot of people know how to do that".

In actual fact before the year 1500 nobody knew how to do it and the most influential book of that time – "Summa de Arithmetica, Geometrica" by Fra Luca (Publishers Venice, 1494. 2 ducats+tax) – went so far as to state that a general method, other than trial and error, for solving equations beyond the quadratic would never be found.

Unfortunately for the Fra's royalties it soon became obvious that Scipione del Ferro, a professor of mathematics at the University of Bologna, had a general method for solving equations of the form:

$$x^3 + a \times x = b$$

and had passed it on, in secret, to some of his students – in particular Antonio Fiore.

None of these men ever published the method for a very good reason. Academic posts in mediaeval Italy were often awarded as the result of a public competition. The applicants would agree on a subject and the actual contest was often a gala occasion with each contestant attended by his supporters.

Side bets on the outcome were part of the entertainment with the actual disputants often facing bankruptcy as well as dishonour should they lose.

Fiore, a mediocre mathematician, appears to have had about 10 successful years with his secret weapon in such contests. But in 1535 he made a great mistake – he challenged Niccolo Fontana, nicknamed Tartaglia, to a

cubic solving contest.

Now Tartaglia was probably the foremost mathematician of his time and honour bound to accept this mathematical challenge. He did not know how to solve Fiore's limited form of the cubic but he did know how to reduce the full form:

$$x^3 + a \times x^2 + b \times x + c = 0$$

to Fiore's form (by the simple substitution of $x=y-a/3$), so the first thing he did was set all his questions in the full form.

Fairly sure that his opponent couldn't solve such problems, Tartaglia then worked frantically to re-discover Fiore's method. Fortunately on the night of February 12, 1535 inspiration came to him and he then solved all 30 of Fiore's problems in a few days. So great was the honour when Tartaglia won the contest 30-1 that he generously refused the prize of 29 banquets.

And still nobody published the method, least of all Tartaglia, whose fame spread throughout Europe – not only for his mathematical ability but also for his study of the new science of

ballistics, a subject that he did write about.

In 1539 he received a letter from Jerome Cardan of Milan criticising his book "The New Science of Artillery", posing a cubic problem and challenging him to a public debate.

Offensive letters are an old trick to get a response. Tartaglia replied with amused arrogance and, oddly enough, the two men became quite friendly. After a while Tartaglia visited Cardan in Milan for a day or so and the cubic equation was discussed. Tartaglia made Cardan swear a sacred oath that he would never reveal the secret and then gave him the method in the form of a cryptic poem:

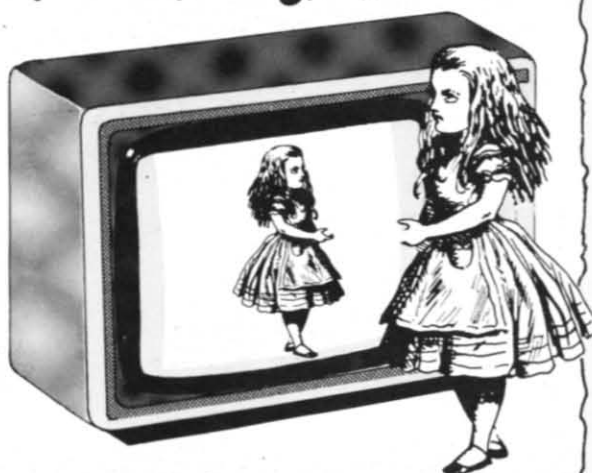
"Quando chel cubo con le cose appreso
Se agguaglia a qualche numero discreto"

and so on for nine lines. What this all boils down to (in modern mathematical notation – they hadn't even invented the = sign in those days) is:

```
IF x^3+px=q LET u=v=q AND u=v+p*p/27  
THEN x= (cube root u) - (cube root v)
```

It took Cardan, with the aid of his

Alice through the VDU



Our monthly foray into Adventure games

The Great Cubic Equation Adventure

secretary, a few months to decipher the poem, apply the rule to the general form, realise that there must always be three solutions – 27 has the number 3 and two imaginary numbers – and vaguely appreciate that there is a relationship between the roots and the coefficients of the equation.

Isn't maths fun!

The culmination of this mathematical adventure (they thought God had written the program) was the discovery of a general method to solve quartics – equations of the fourth degree.

This achievement finally made Cardan break his sacred oath and his book "Ars Magna" appeared in 1545 with the following acknowledgements:

"Scipione del Ferro, of Bologna, found in our time a method of solving cubic equations – a beautiful and admirable rule. Such a discovery – a divine gift from beyond the human intellect – proves the existence of the soul. Following later, Niccolo Tartaglia, of Brescia, my friend – re-discovered the rule and, after many requests, confided it to me".

By modern standards this is a generous acknowledgement, and Tartaglia had had 10 years to publish the secret. But he hated Cardan for breaking the oath and never forgave him, despite the fact that Cardan never claimed the original method. I sympathise with Tartaglia because, ever since then, it has been called Cardan's Rule.

One of the appeals of computer adventures is that you know something, utterly useless, that not a lot of others know.

Knowing how to solve cubic equations analytically now falls firmly in this category, because modern computers solve them by approximation.

Nevertheless it can be a useful programming exercise to write a cubic equation solver. The final piece of information you require is a method to extract cube roots using Newton Raphson iteration:

```
10 INPUT "Give me a number",N
20 X1=1
30 REPEAT
40 PRINT X1
50 X=X1
60 X1=(2*X^3+N)/(3*X^2)
70 UNTIL ABS(X-X1)<.000001
80 PRINT X1
```

Random thoughts on security

PSEUDO random numbers are essential for setting up many puzzles. Oddly we derive the word from the French verb "randir" – to gallop – whereas the French and Spanish describe random moves as "a l'aventure".

Cervantes even describes Don Quixote's horse, who rarely broke into a trot let alone a gallop, thus: "He proceeded, taking whatever path his horse pleased; for therein, he believed, lay the spirit of adventures".

It is a paradox that randir implies haphazard and even risky, yet pseudo random numbers are the basis of many security systems.

A simple security example is Quasimodo's bell ringing problem (*The Micro User*, August, 1984). Just how do you sort out 10 ropes within the limited number of moves?

The first answer came from Gabriel White of Sheffield in the form of a 14 beats to the line poem. First consider the simplest case of three ropes:

*"Attach ropes 2 and 3, go down, pull any rope – what fun!
And now you know which vestry rope will ring bell number 1.
Then tie that rope (that rings bell 1) to any other rope,
Upstairs again, to pull rope 1 and now it's clear I hope,
Which vestry ropes will ring the other bells and make them chime.
So down again and Bong Bong Bong – let's do it one more time!*

*To ring 4 bells, tie 1 and 2, then down the stairs you trot;
Judicious pulls show which ropes are (and also which are not)*

The bottom ends of 1 and 2 above you on the floor;

(Those which are not must be the bottom ends of 3 and 4).

Tie one of these to one of those, then up and, on reflection,

Two little tugs will now reveal the up and down connection".

Gabriel then went on to describe how the solution can be worked out for any number of ropes >2. Unfortunately the best "person" I know for explaining poetry has gone missing – I think Geoff Capes ate him – but fortunately C. Lonsdale of Woking sent in a more orthodox answer.

Consider seven ropes. Tie (2-3) (4-5) (6-7). Go down and identify rope 1 – call this X – and label the 3 pairs (A1-A2) (B1-B2) (C1-C2). Now tie them (X-A1) (A2-B1) (B2-C1) and return to the belfry. Pull rope 1 and now you know which rope is A1 therefore you can identify A2 (you tied it to A1 at the start). Pull rope A2 and now you know which rope is B1 therefore you can identify B2 etc. etc. The method obviously works for any number of odd ropes.

Now consider eight ropes (or any even number >2). Tie the same ropes as before. Down in the vestry you find three pairs and two free ropes – call them X and Y. Tie them as before (X-A1) (A2-B1) (B2-C1) and up. Rope Y is the rope that is still unconnected. The remaining ropes are then identified as before.

Note that the final trip to the vestry is

“One of the appeals of computer adventures is that you know something, utterly useless, that not a lot of others know”

From Page 137

just to convince Quasimodo that you have solved the problem.

With practice you should be able to solve 10 ropes (3,628,000 possibilities) in less than a minute. The puzzle illustrates a fairly good changing password security system.

The weakness is that, unlike the cubic equation, the random "password" exists within the program's arrays and can be cheated.

Take a long ladder

A COUPLE of pseudo adventures this month, neither of which depend on galloping. Ladders can be useful and the longer the better, so...

You are walking down a narrow built-up alley and find two crossed ladders, their feet the width of the alley apart and forming a fairly symmetrical X. You can measure the length of a

```

5 L=407
10 R=RND(3)
20 FOR I= 1 TO 3
30 INPUT "MEASURE Ladders, Alley,
or Crossing",A$
40 A$=LEFT$(A$,1)
50 IF A$(">")A$ THEN 80
60 PRINT"The alley is ";(L-22)*R;
"cas wide"
70 GOTO 130
80 IF A$("<")L THEN 120
90 PRINT"The left ladder is ";L*R;
"cas long"
100 PRINT"Whoops - dropped the tape
measure"
110 GOTO 140
120 PRINT"The ladders cross at ";(L
+1)*R/6;"cas"
130 NEXT I
140 INPUT"Which ladder is longest?"
,A$
150 GOTO 10
    
```

ladder, the width of the alley and the height at which the ladders cross. Find the length of both ladders.

If used in an adventure the program

would insist on an exact figure so a rule of thumb won't necessarily get a plum.

For those readers who don't have a computer and can't decode the above program here is another, similar problem.

In "Tintin and the Prisoners of the Sun" either Snowy or Captain Haddock — probably both — are lying in a drunken stupor inside a runaway railway carriage which is 12 feet wide and 88 feet long.

The external emergency brake is on the front centre of the carriage and Tintin is at the back centre. He jumps off, runs to the front and reaches the brake in 10 seconds just as the carriage, rolling at a constant velocity, has travelled its own length.

How fast did Tintin run?

Note that if the carriage is stationary he would have to run exactly 100 feet. A double prize to anyone who can solve both problems.

Finally I have decided to solve Pimania.

Would any reader like to swap or sell a BBC version?

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PETER GAUNT shows how to ring the warning bells when you're in danger of wiping a precious file . .

Play safe with Wordwise

SAVING over an existing file can be a constant worry for users of Wordwise on a disc-based BBC Micro. How can they avoid inadvertently loading new text into memory over the top of an existing document?

This utility provides the answer.

Type in the listing, save it and run it. This will assemble the code and also *SAVE it with the file name *SAFE*.

Now when you want to use the saved code just *RUN *SAFE*. The code is disabled by pressing Break so if you want to destroy a whole document, type *W. and answer N. After returning to Basic, press Break.

The program consists of three main routines. *Init* which changes the OSFIND and event vectors to point to new code and sets up a sound envelope; *events* which checks to see if you've pressed "2" in the menu; *filing* which checks if calls to OSFIND are for save requests.

The OSFIND vector will point to the *filing* routine which will check to see if the request was to save or load a file. If it was to load then it exits down the old OSFIND vector.

If the request was to save, then it

checks to see if a file with the given name already exists on the disc using OSFILE with A=5. If it doesn't then the file is saved without the user being aware of anything having happened.

If, however, the file does exist, then a message to that effect is printed, a bell is rung and you are asked if you still want to save. If you answer Y then the file is saved, otherwise saving is aborted.

It would be nice to intercept load requests in a similar way. Unfortunately Wordwise seems to reset its pointers as soon as a file name is entered.

Instead a totally different method is used. When an event occurs, the micro finds the event vector pointing to the *events* routine which checks if the event was caused by a figure 2 entering the keyboard buffer. If it wasn't, it exits

down the old event vector.

If 2 has been pressed a decision now has to be made about whether Wordwise is in *menu* or *edit* mode, which it can do by checking the cursor status with OSBYTE 237.

The cursor status is different in the two modes. If in menu mode it then checks to see which line the cursor is on. It needs to do this in case the reason for pressing 2 was other than a request to load a file — for example, part of *Command.

If the cursor is on line 17, then the routine assumes that menu option 2 has been chosen, rings a bell and prints a message. This assumption has not caused any problems at all.

To change your mind about loading, hit Esc before entering the filename.

```

10 REM *** SAFE ***
20 REM Wordwise Utility program
30 REM (c) The Micro User
40 REM Code to intercept load & save requests in Wordwise.
50 REM Assembled code is automatically saved after assembly
60 REM with filename "SAFE".
70 pointer=&90
80 old_eventvec=&232
90 old_findvec=&234
100 storeA=&96
110 eventvec=&220
120 findvec=&21C
130 oswrch=&FFEE
140 osasci=&FFEE3
150 oscli=&FFF7
160 osbyte=&FFF4
170 osnewl=&FFE7
180 osfile=&FFDD
190 osrdch=&FFEE0
200 osword=&FFF1
210 env=&900
220 !env=&FF010101:REM envelope parameters
230 env!4=&1010101
240 env!8=&FEFEFE7F

250 env!C=&5E7E
260 sound=&90E:REM sound parameters
270 !sound=&10002
280 sound!4=&50096
290 code=sound+8
300 block=code:REM parameter block for OSFILE. Will overwrite init routine
310 REM but doesn't matter since in it is only called once.
320 FOR IX=0 TO 2 STEP 2
330 PX=code
340 +OPTIX
350 .init %change vectors, define envelope, enable keyboard event.
360 LDH#env MOD &100
370 LDY#env DIV &100
380 LDA#B
390 JSR osword %define envelope
400 LDA findvec %store old vectors and reset
410 STA old_findvec
420 LDA findvec+1
430 STA old_findvec+1
440 LDA#filing MOD &100
450 STA findvec
460 LDA#filing DIV &100

470 STA findvec+1
480 LDA eventvec
490 STA old_eventvec
500 LDA eventvec+1
510 STA old_eventvec+1
520 LDA#events MOD &100
530 STA eventvec
540 LDA#events DIV &100
550 STA eventvec+1
560 LDA#14 %enable keyboard event
570 LDH#2
580 JSR osbyte
590 RTS
600 .events %event vector now points here
610 STA storeA
620 PHP
630 PHA
640 TXA
650 PHA
660 TYA
670 PHA
680 LDA storeA
690 CMP#2 %check that event is keyboard event

```


Wordwise Utility listing

From Page 139

```

700 BNE end      %if not exit down o
ld event vector
710 CPY#ASC"2"    %ascii code of key
passed in Y
720 BNE end      %if not "2" exit d
own old event vector
730 LDA#237      %read cursor editing s
tatus
740 LDX#0
750 LDY#&FF
760 JSR osbyte
770 CPX#0 %X=0 if normal cursor (i
.e. if in menu)
780 BNE end      %if not in menu exit
down old event vector
790 LDA#134
800 JSR osbyte %read cursor positi
on. Line number returned in Y.
810 CPY#17 %cursor on line 17 only
if no options have been chosen
820 BNE end      %cursor not on line 17
exit down old event vector
830 LDA#11
840 LDA#13 %move cursor up one li
ne
850 JSR oswrch
860 LDA#load MOD &100 %store addre
ss of "load" message in pointer
870 STA pointer
880 LDA#load DIV &100
890 STA pointer+1
900 JSR print %print LOAD message
910 JSR bell %ding-ding
920 JSR bell
930 .end
940 PLA %restore registers and ex
it down old event vector
950 TAY
960 PLA
970 TAX
980 PLA
990 PLP
1000 JMP(old_eventvec)
1010 .load
1020 +
1030 $load=CHR$11+CHR$11+CHR$11+CHR$
136+CHR$131+"LOAD - escape to cancel"
1040 PX=PX+1+LEN$load
1050 +OPTIX
1060 .filing %osfind vector poin
ts to here now.
1070 STA storeA
1080 PHA
1090 PHP
1100 TXA
1110 PHA
1120 TYA
1130 PHA

```

```

1140 LDA storeA
1150 CMP#&80 %file open for sav
e has A=&80
1160 BNE end_file %if not save exit
down old osfind vector
1170 STX block %X & Y will be set
to point to address of file name type
d
1180 STY block+1 %in. Store in firs
t two bytes of block.
1190 LDX#block MOD &100
1200 LDY#block DIV &100
1210 LDA#5
1220 JSR osfile %read catalogue inf
o for named file
1230 CMP#1 %A=1 if file found (bloc
k will contain files catalogue info b
ut
1240 %this is not needed
1250 BEQ existing
1260 JMP end_file %if doesn't exist
already save as normal (no message)
1270 .existing
1280 LDA#exists MOD &100 %store add
ress of "exists" message in pointer
1290 STA pointer
1300 LDA#exists DIV &100
1310 STA pointer+1
1320 JSR print %print "file exists
" message
1330 JSR bell %hand ring bell twic
e
1340 JSR bell
1350 JSR osrdch %get character from
keyboard
1360 JSR oswrch %print character
1370 DRA#&20 %OR character with &20
- converts upper case to lower case.
1380 CMP#ASC"y"
1390 BNE nothing %if character not
"Y" or "y" then don't save
1400 LDA#saving MOD &100 %store add
ress of "saving" message in pointer
1410 STA pointer
1420 LDA#saving DIV &100
1430 STA pointer+1
1440 JSR print %print "SAVING" me
ssage
1450 .end_file %restore registers a
nd do whatever filing was requested
1460 PLA
1470 TAY
1480 PLA
1490 TAX
1500 PLP
1510 PLA
1520 JMP (old_findvec) %exit down o
ld OSFIND vector
1530 .nothing %used if not to save
after all

```

```

1540 LDA#138
1550 LDX#0
1560 LDY#32 %put character in keybo
ard buffer to remove Wordwise's
1570 JSR osbyte %"Channel" error me
ssage.
1580 PLA
1590 TYA
1600 PLA
1610 TAX
1620 PLP
1630 PLA
1640 RTS %return to Wordwise
1650 .exists
1660 +
1670 $exists="File exists - overwrit
e? "
1680 PX=PX+1+LEN$exists
1690 +OPTIX
1700 .saving
1710 +
1720 $saving=CHR$136+"SAVING"
1730 PX=PX+1+LEN$saving
1740 +OPTIX
1750 .print %print messages ro
utine.
1760 JSR osnewl %address of text i
s passed in pointer
1770 LDY#0
1780 .p_loop
1790 LDA (pointer),Y
1800 CMP#&0D
1810 BEQ p_end
1820 JSR oswrch
1830 INY
1840 JMP p_loop
1850 .p_end
1860 RTS
1870 .bell %ring bell
1880 LDX#sound MOD &100
1890 LDY#sound DIV &100
1900 LDA#7
1910 JSR osword
1920 RTS
1930 +
1940 NEXT
1950 x$="SAVE SAFE 900 "+STR$+PX+" "
+STR$+init
1960 REM Following lines can be repl
aced in Basic 2 with OSCLI(x$)
1970 DIM B 30
1980 XZ=B MOD &100:YZ=B DIV &100
1990 $B=x$
2000 CALL oscli
2010 *ACCESS SAFE L

```

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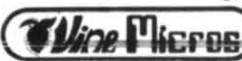
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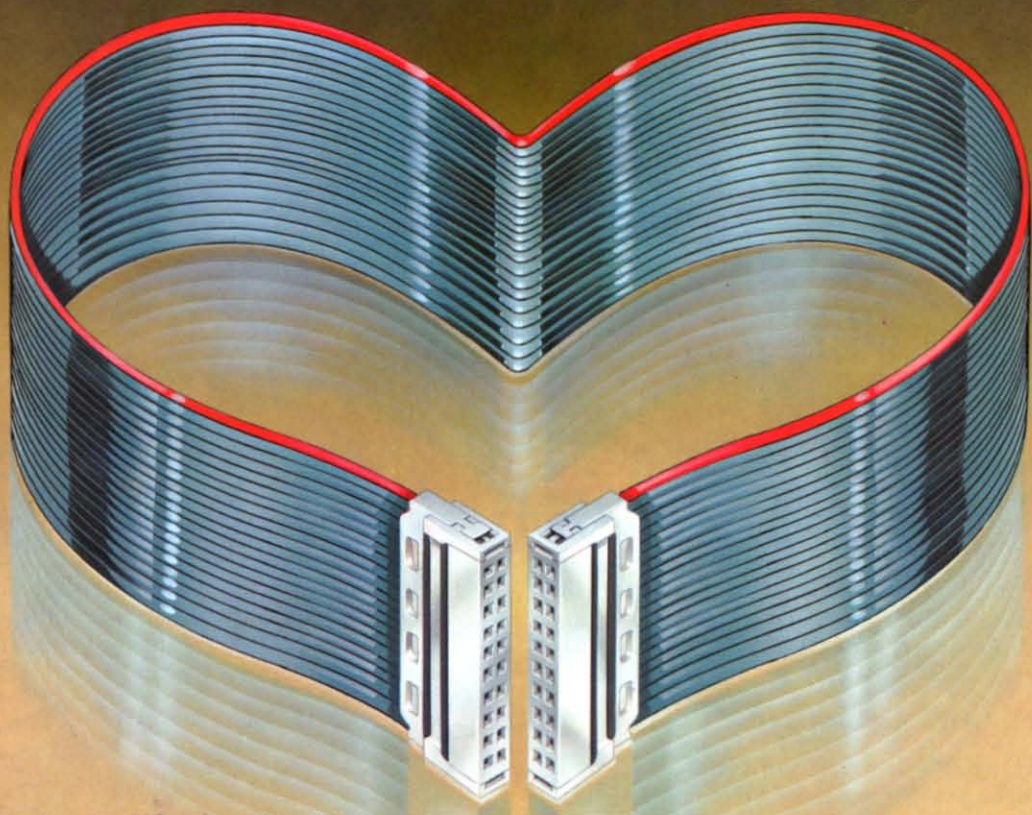
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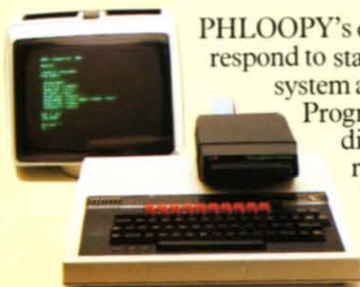
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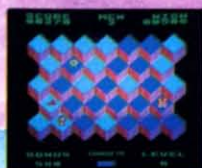


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AT *The Micro User* office we're used to seeing innovative pieces of new hardware and software for the BBC Micro — with so powerful and versatile a machine it's only to be expected.

However, occasionally a product reaches us that is so outstanding that the office is in a turmoil for days as the battle rages to see who's going to review it.

Such was the case with the AMX Mouse — not a furry little rodent in this case but a superb device that threatens to do away with the keyboard as we know it.

Like most great ideas, the concept behind it is simple: you use the mouse to control the position of a cursor on the screen.

The mouse itself is an easily held

creature that you move over the surface of a desk on its single spherical wheel.

As it moves so does the cursor, in a much more natural and easy to use manner than with a joystick.

However, it's not just a high-powered joystick. It comes complete with ROM based software that exploits the mouse's potential to the full.

In its simplest mode, the ROM enables the mouse to take over the normal cursor keys' functions — of great

use with such software as View and Wordwise.

It also checks for the three user buttons on the back of the mouse — which can be defined as any of the keyboard's own keys.

The mouse really comes into its own when combined with icons, however. These are mini-pictures which allow you to talk to the micro in picture language.

Instead of picking from a menu by choosing 1, 2 or 3, you are simply given

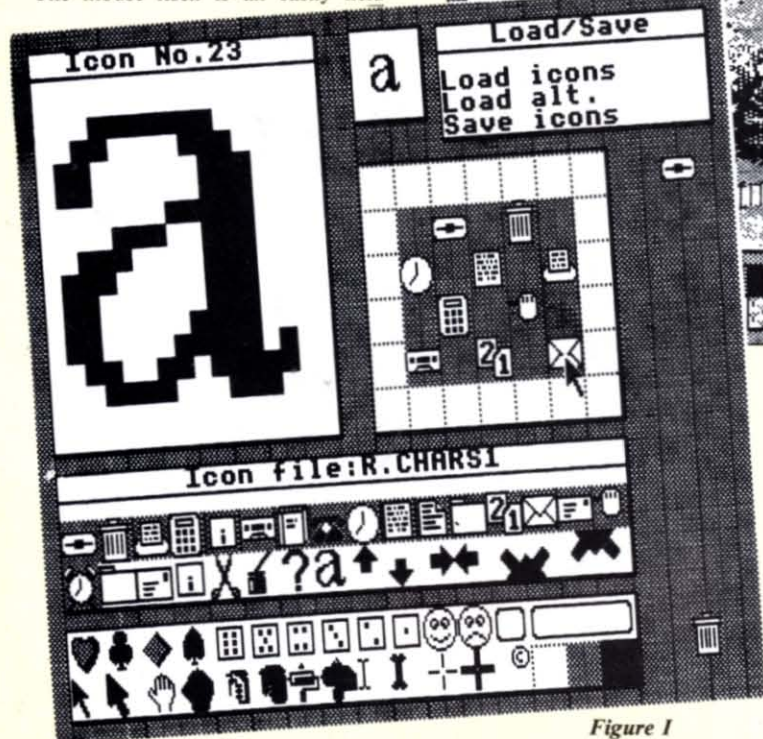


Figure 1

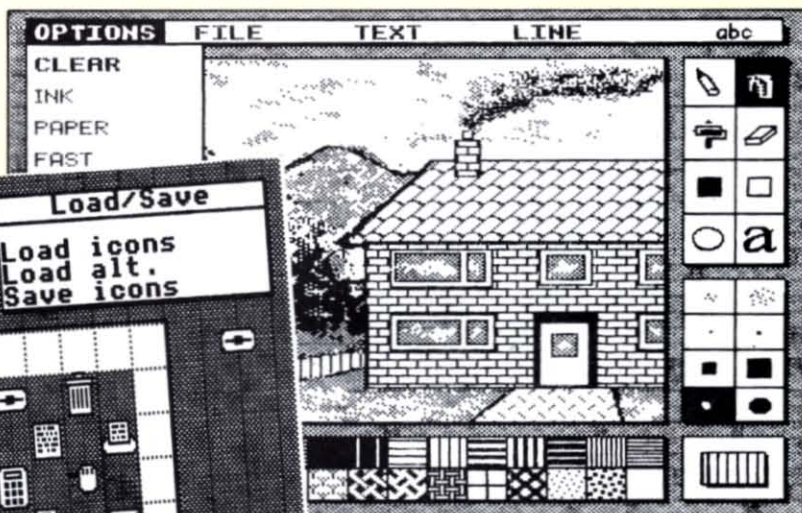


Figure 2

September winners

WINNERS of our September contest were Mr R.G. Asbey of Inverurie, Nick Davies of Altrincham, and Richard Lawrence of Hayling Island. They will be receiving the amazing multi-Forth 83 ROM from Skywave Software.

There are three to be won, so you're in with a good chance. Don't forget, though, we have to receive your entries by January 2, 1985.



Your mouse contest entry form

Then send your completed entry to: MOUSE Contest, *Micro User*, Europa House, 68, Chester Road, Hazel Grove, Stockport SK7 5NY. All entries must reach us by January 2, 1985.

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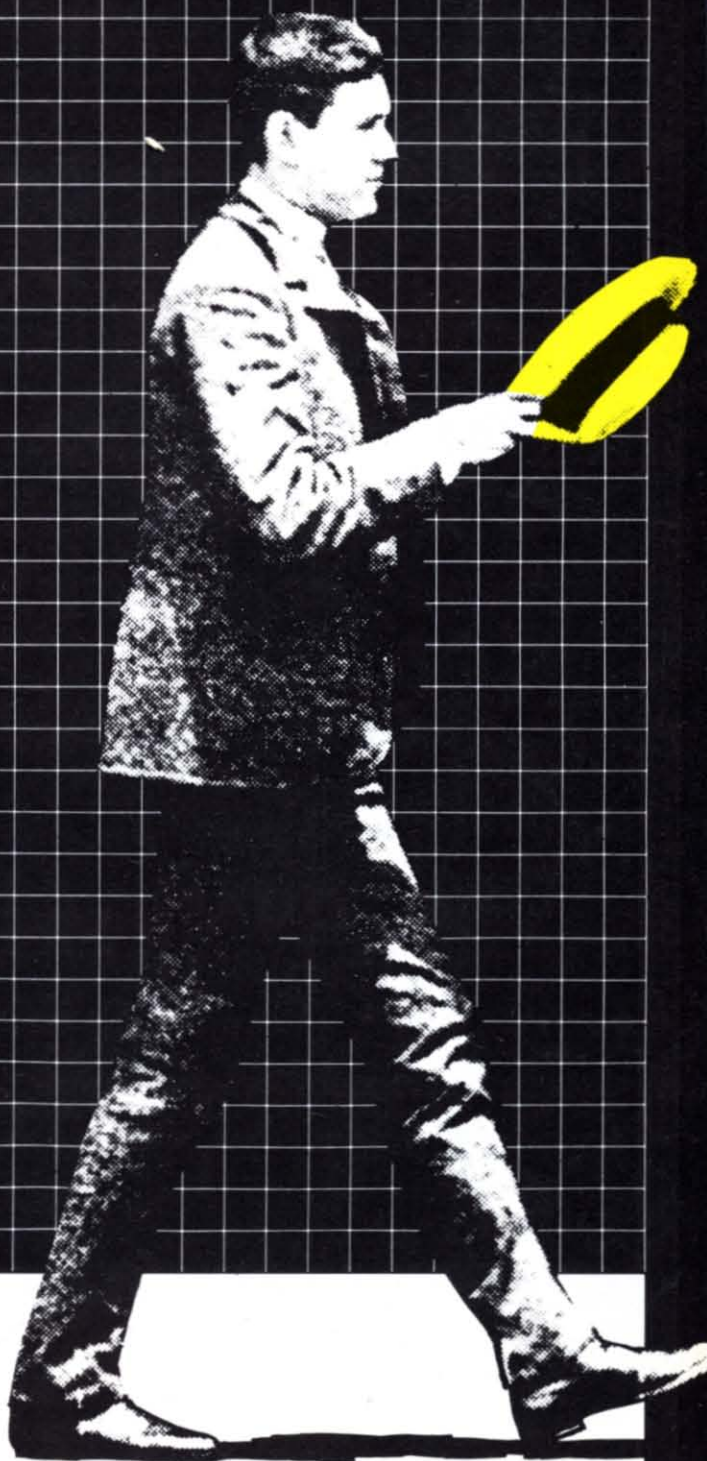
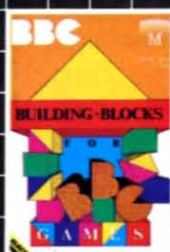
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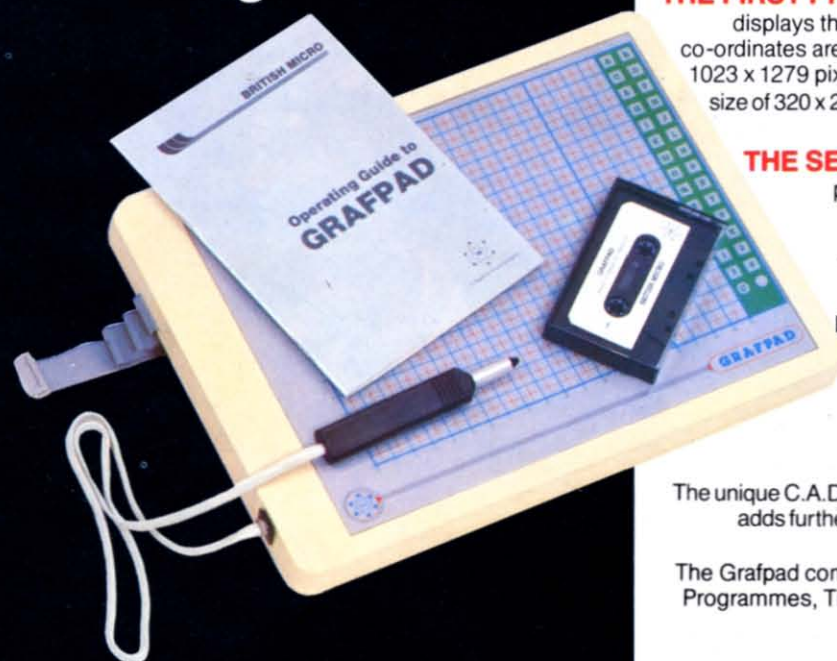
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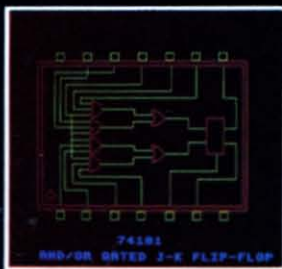
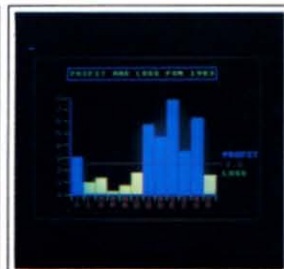
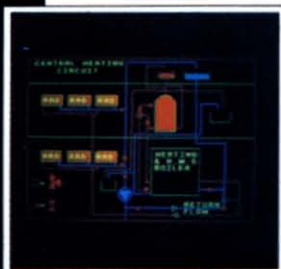
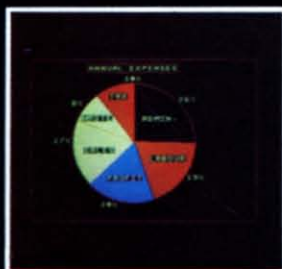
provides you with the utilities for circles, squares, triangles, free-hand, erasing line-drawing etc, and of course, full "Fill-in" facility in 16 different colours by the simple use of the pen!

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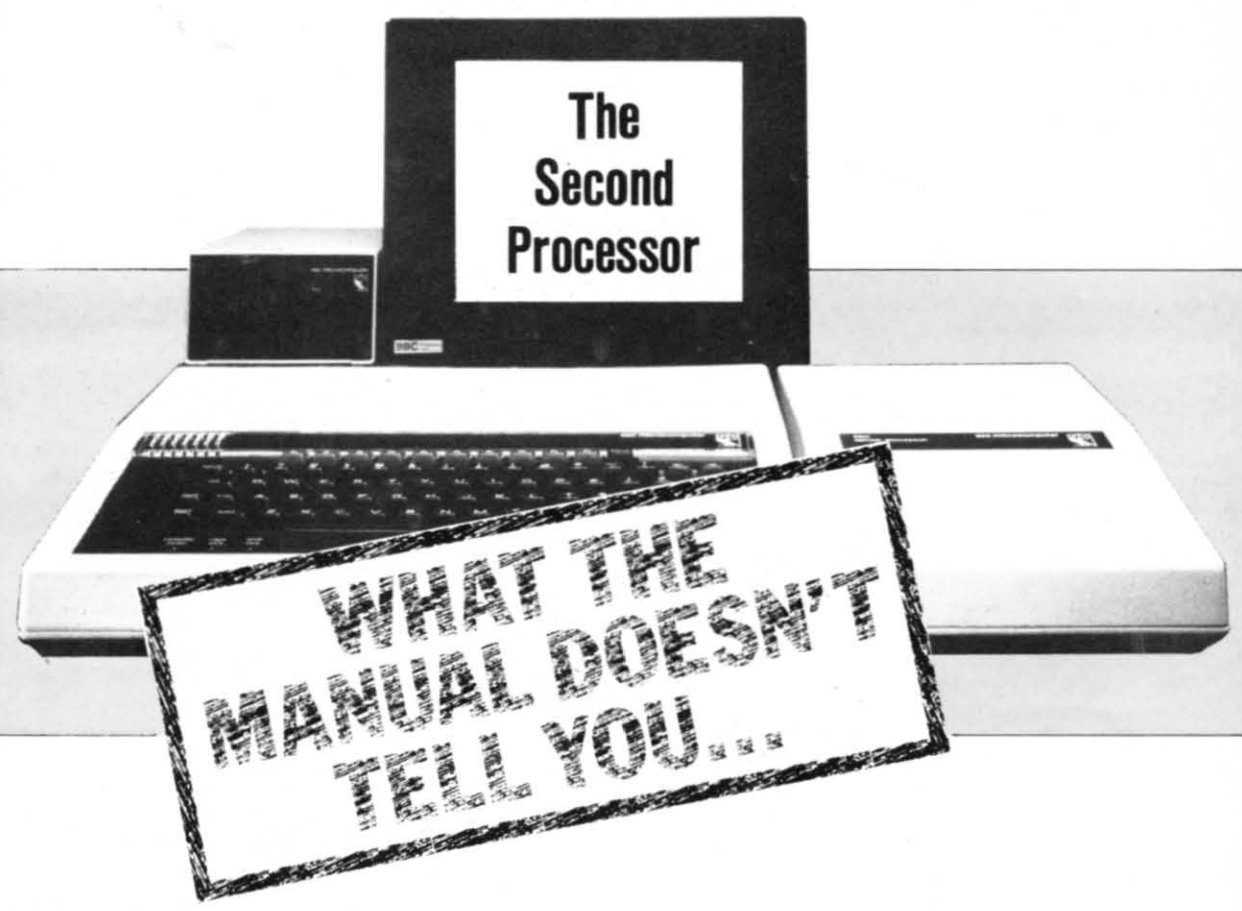
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The Second Processor

WHAT THE
MANUAL DOESN'T
TELL YOU...

Where the DNFS begs to differ

THE second processor's DNFS (Disc/Network Filing System) has a few differences from previous versions of the DFS which are not mentioned in the manual.

The DNFS remembers the current drive and directory after a Break, but not a Shift-Break or Ctrl-Break, so you cannot auto-boot a file on any drive or directory other than :0.\$.

If you forget to type *ENABLE before a *BACKUP or *DESTROY, instead of getting the rather annoying 'Not enabled' message, it replies with "Go (Y/N) ?", and typing anything other than Y will abort the operation.

Another main difference between DNFS 1.2 and DFS 0.90 is that file handling is about twice as fast – the

same speed as 0.98. And the annoying habit in DFS 0.90 of raising and lowering the drive heads between each sector when handling files, or with OSWORD 7F – which occurred with some drives – has been eliminated (as in 0.98). This was especially annoying when using long Wordwise files.

The bug in 0.98, where the wrong error number was sometimes given for certain filing system errors, has been fixed.

If you try to access an empty drive you can press Esc to abort (as in 0.98), rather than having to either insert a disc or hit Break, which is what you had to do with 0.90. *DUMP is 50 per cent faster than 0.98 and 0.90.

One interesting quirk of the DFS occurs if you *SAVE a file with FFFF in front of the addresses (so that it will reload on the I/O processor) but the execution address does not have the

FFFF in front of it.

Although the file will be loaded into the I/O processor, the execution address will be in the second processor and a jump will occur to the second processor at the specified address. This will probably work the other way around as well.

The DNFS checks to see if the disc or Econet hardware is present, and does not claim the workspace for any filing system not present. The problem is that this is only done on a power-up Break, and any program which overwrites disc workspace can cause the DFS to 'die', making it impossible to save or load anything.

*FX200.2 followed by Break will recover the DFS, but will also wipe out any program in the I/O processor memory. Location &DF0 is where the

MIKE HARRISON reveals some of the things you really ought to know about the Acorn 6502 second processor

From Page 151

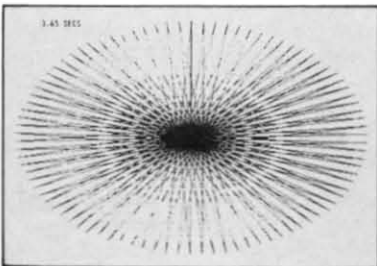
DNFS stores the flag indicating whether or not the DFS is active. If bit 6 of this location is set, the DFS is disabled.

This may be used to prevent program corruption which sometimes occurs if PAGE has been moved down (when the second processor is not in use), and Break is pressed, as when the DFS is inactive, its workspace is not taken, and PAGE is at &E00.

So typing ?&DF0+n=64, where n is the number of the ROM socket, will disable the DNFS, and if any disc operations are required, ?&DF0+n=0 will restore normal operation.

Note that Break must be pressed after changing the contents of this location. This may be done by the software by CALL &D9CD, after programming the Break key to restart the program at the appropriate place with *KEY 10.

When using the second processor, *COPY, *BACKUP and *COMPACT no longer corrupt your program, but you still need to go into Mode 7 to speed up these operation – more of the I/O processor's memory is then free to use as a buffer.



Second processor speeds graphics

Double up your speed

THE extra speed obtained when using the BBC Micro's 6502 second processor has often been quoted at 50 per cent because of the increased clock speed, but in some cases, it can be over 100 per cent – twice as fast!

This short program takes about eight seconds on a standard BBC Micro and

3.58 seconds using the 6502 second processor:

```
10 TIME=0 : MODE0 : MOVE640,0 : FOR
AZ=0 TO 360 STEP 8
30 DRAW SIN RAD (AZ+180)*640/640,C
OS RAD (AZ+180)*512/512
40 DRAW SIN RAD AZ*640/640,COS RAD
AZ*512/512
50 NEXT : PRINT TIME/100 " SECS"
```

The reason for this extra speed is that time-consuming graphics routines such as drawing long lines are being executed at the same time as the next set of coordinates is being calculated.

Optimum speed can therefore be obtained when the calculation and the graphics routines finish at exactly the same time, so neither processor is waiting for the other.

I wouldn't be surprised if a greater speed difference than that shown by the program above could be achieved.

Hi-Basic spells good!

THE manual states that Hi-Basic is the same as Basic II, but this is not completely true – I have found two differences so far.

Hi-Basic accepts COLOR as an alternative spelling for COLOUR, but always prints COLOUR in listings. Also, when using the assembler, comments in the listing are tabbed out into another column, instead of being printed in the same column as the mnemonics, as Basic I and II do.

Once over the tube you can change mode within a procedure or function in all three version of Basic (I, II and Hi-).

Distinguishing between Basic and Hi-Basic can sometimes be difficult.

Printing HIMEM may not work if a program has changed its value, so if you have an Eprom blower it is a good idea to change the word 'BASIC' stored at the start of the Hi-Basic Eprom (&8009) to, say 'Basic' or 'HIBAS', so that this is printed when you enter it, or press

Break, rather than 'BASIC'.

Do not try to put anything longer than five letters in this title space. It will still be recognised as Basic whatever is put in here. For example, if you called it HIBAS, *HIBAS would not call it, and you still have to use the rather messy *FX142,n method.

As the only way to enter Hi-Basic is via *FX142, any program needing to use it will have to be modified if it is to be used on different machines, which may have Hi-Basic in different sockets.

The following program will automatically find, and enter Hi-Basic, regardless of what socket it is in:

```
10 REM HI-BASIC FINDER
20 FOR pass = 0 TO 3 STEP 3
30 PX=&900 : [ OPT pass
40 LDY &F4 : LDY#15 : .LOOP
50 STX &F4 : STX &FE30
60 LDA &80E7 : CMP#67 : BNE NFOUND
70 LDA &80E8 : CMP#79 : BEQ FOUND
80 .NFOUND DEX : BPL LOOP
90 DEX : BPL LOOP
100 STY &F4 : STY &FE30
110 BRK : BRK
120 EQU "HI-BASIC not found" : BRK
130 .FOUND LDA#142 : JMP&FFF4
140 J : NEXT pass
150 PRINT "SAVE (Y/N) ?"
160 IF GET$="Y" THEN *SAVE HIBASIC
FFFF0900 FFFF0940 FFFF0900
```

After running the program, and saving the object code, typing *HIBASIC will find and enter Hi-Basic. This command would normally be included in a IBOOT file, as using it from within a Basic program will probably cause a crash.

It is possible to leave a program in the I/O processor while using the second processor, as long as the exploded user-defined characters are not used.

To illustrate this, load a program with the second processor off, turn it on, and press Ctrl-Break.

Programs may now be run in the second processor. But when it is turned off, and Ctrl-Break pressed, typing OLD should reveal that the original program is still there.

Power pointer

THE power connections on the 6502 board are made by the same sort of push-on connectors used on the BBC Micro, and the wires are crimped into

One fairly safe spot

THE main problem with using machine code from Basic on the second processor is the lack of a safe area below the program space in which to assemble the code, without worrying about changing PAGE or HIMEM. Although the manual says that locations &300 to &3FF are used for error messages, this area seems to be a fairly safe place, at least for temporary workspace or storage.

these connectors. On my unit they were not crimped tight enough and a very light pull caused one wire to come out.

If your 6502 suddenly goes dead, check that these wires are secure. If not, solder them back rather than recrimping. Unplug the spade connectors from the board before soldering.

It is a good idea to put a 'power on' indicator on the second processor box, or on a lead coming out of the box somewhere if you don't want to drill a hole in the case.

This is because it is not always obvious when it is on – a LED with a 220 ohm series resistor across the 5v supply should do the trick.

ROM compatibility

VIEW, Viewsheet, BCPL, Ultracalc and Printmaster all work perfectly. I wonder if Acorn are going to produce hi-versions of View and Viewsheet?

Exmon will work, but any functions requiring Basic – assembler, use of variables or expression evaluation – will not, and ? to get a command list doesn't work either. To exit from Exmon, Q doesn't work, but *B. has the same effect.

Note that it is possible to have Exmon and Hi-Basic in the second processor simultaneously – useful if one or both of these is on disc to save on ROM sockets.

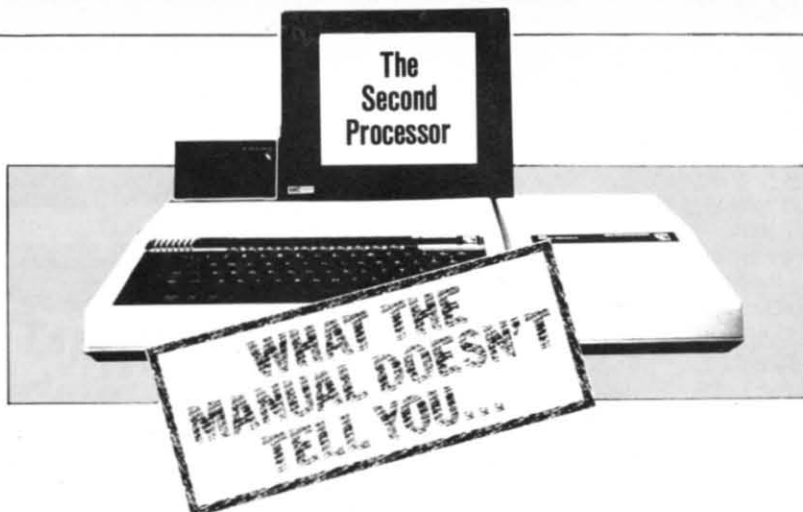
To do this, load Exmon using *E if it is in ROM or *EXMON if on disc, and then from Exmon type *FX142,n where n is the socket containing Hi-Basic, or if it is on disc *HIBASIC, or whatever the filename is.

To enter Hi-Basic type *GO B800 and Exmon is entered using *GO8000. Note that HIMEM should be set to &8000 to stop Exmon being corrupted.

Note also that the ROMs must be called in this order. Any ROM is transferred from the I/O processor as 16k, regardless of its actual size, so Exmon would overwrite 2k of Hi-Basic.

Wordwise will not work. Text being typed does not appear on the screen, as it is POKEed into screen memory – although previewing text reveals that it has actually been entered.

Disc Doctor: *FORM puts the wrong track number information on the disc, so when you try to use the formatted disc the drive will make a nasty graunching sound as the disc controller tries to find track zero.



SWAP doesn't work – nasty if you have lots of dual-catalogue discs.

The only parts of Disc Doctor which seem to work correctly are EDIT, DIS, MZAP, MSEARCH, VERIFY and SHIFT, although these only act on the I/O processor's memory. But it can be quite useful to be able to see what's going on within the I/O processor, and Exmon has similar functions which can be used to look at the second processor's memory.

Disc Doctor can also have nasty effects on Bitstik – see later.

If you need utilities to format or examine discs, *FORMAT and *DEDIT in *Spy 2* seem to work correctly.

Toolkit doesn't work at all as far as I can see, except *SCREEN. But it does not put the 'FFFF' in front of the address, so to reload the screen you have to use *LOAD (filename) FFFFxxxx, where xxxx is the start of screen memory in the mode being used. *FREE and *HELP INFO both crash the machine.

Note that if language-type ROMs (View, etc.) are loaded from disc into the second processor they will not produce the normal response to *HELP, as the service call which does this on the I/O processor is not passed to the second processor.

Running machine code

IT is sometimes necessary to be able to call a machine-code routine in the I/O processor from within the second processor, for example, a high-speed graphics routine. There are several ways of doing this:

☐ If the code is not called very often, then it may be *RUN from disc, as long as the 'FFFF' was put in front of the addresses when saving.

☐ The code can be *LOADED into the

I/O processor by putting the FFFF in front of the addresses when *SAVING, and then changing USERV (&200,1), the vector used by *LINE and *CODE, using OSWORD 6 to poke the new values into the I/O processor's vector table – not the vectors in the second processor.

Remember that most calls (including OSWRCH, etc.) are vectored twice – once via the vector table in the second processor, and again when the call gets to the I/O processor. The code may now be called with *LINE or *CODE as appropriate.

Pressing Break will cause the vector to be rewritten, so you will have to rewrite the new value. Values may be returned to the second processor, either by using OSWORD 5 to read bytes from the I/O processor, or by the routine in the I/O processor inserting characters into the keyboard buffer.

☐ The code may be assembled in the second processor, transferred across the tube using OSWORD 6, and then called by the method outlined above.

The OSWORD 5 and 6 calls are rather slow. When transferring large amounts of data (16k+), it may actually be quicker to *SAVE it to disc, putting FFFF in front of the reload address (the optional fourth address for *SAVE – see the Advanced user Guide page 19), and then *LOAD it back into the I/O processor.

It must be possible to have two programs actually running simultaneously, one in each processor, but it would probably be quite difficult to arrange this. The only method I can think of is as follows:

*LOAD the code into the I/O processor, change the event vector or one of the IRQ vectors so that the code in the I/O processor is triggered by the next interrupt or event.

Data may now be passed to the code

From Page 153

via *CODE, *LINE, or OSWORD 6 – OSWORD 5 being used to read back the result. This method may not be feasible if the routine is too long.

If you really want to be clever, the routine could be split so that only part of it is executed after each interrupt, so as to keep each interrupt service short.

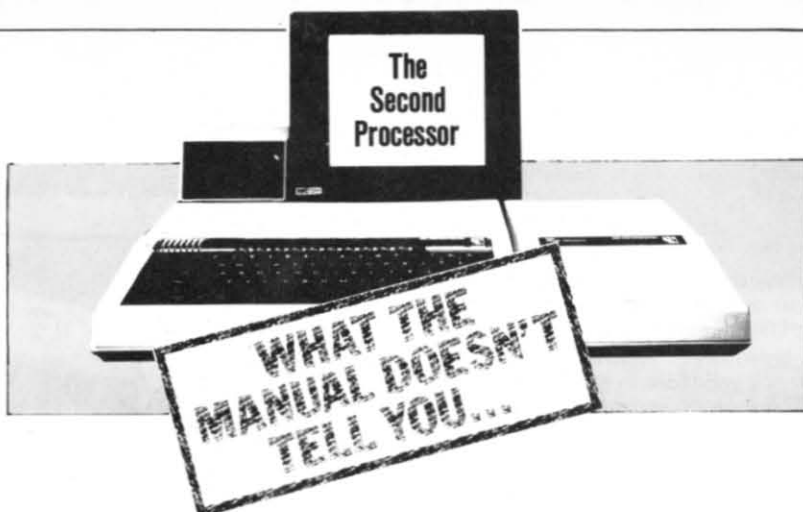
This method would be incredibly tricky to implement, but if it worked the true co-processing obtained could provide impressive speed improvements.

It does not seem possible to simulate the pressing of Break by software as was possible on the I/O processor, because both processors need to be reset at the same time.

Also the reset line of the second processor's 6502 which is derived from the I/O processor's reset line – normally activated by the Break key – is used by the hardware to control the copying the eeprom to RAM.

For those interested, this is how copying is done:

When the Reset line goes low, one of the latches in IC6 is set. This causes any



read cycle on the upper half of the memory map to access the eeprom, write cycles going to the RAM as normal, so a read followed by a write will copy a byte from the eeprom to RAM.

IC 9 ensures that the RAM is disabled when the eeprom is being read. When the Tube ULA is accessed the latch is cleared, restoring normal RAM Access.

You may have wondered why a 4k eeprom is used when only 2k of it contains code. Remember the early

BBC Micros with the operating system in four 4k eeproms that Acorn were happy to replace free?

If an attempt is made to use an undocumented OS call, the error 'Bad' occurs, with an error number of &FF.

The second processor's operating system contains the error message, "I cannot run this code", but I can't find any direct jumps to this message. I suppose it might be issued if an attempt to enter a language ROM written for the Z80 second processor is made.



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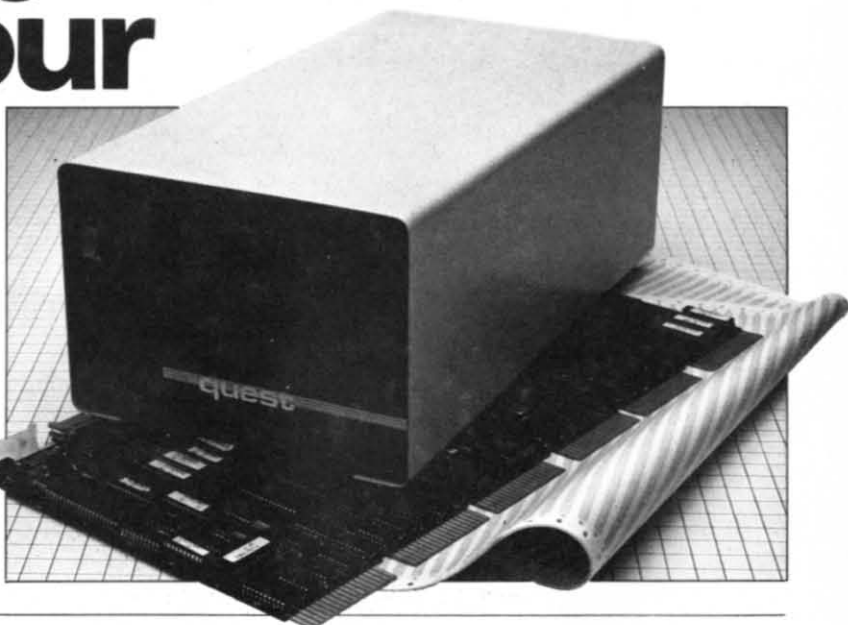
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BU12

Straight line route to a natty circle

TO draw a circle using your computer you need to draw a polygon with so many sides that it looks like a circle.

The exact number of sides you need depends on the graphics resolution of the mode you use and on the size of the circle. However 30 sides are adequate for most applications.

The points on a circle must be generated so that they are evenly spaced. This normally leads to using the formula:

$$X=R*\cos(TH)$$

$$Y=R*\sin(TH)$$

where X and Y are the coordinates of the point, R is the radius and the angle TH is varied through 360 degrees.

This produces a perfectly adequate circle or polygon, the number of sides depending on the rate of change of the variable TH.

However the calculation of SIN and COS is time consuming for a computer and, as it must be done for every point, results in the circle being produced relatively slowly.

It is possible to express the points needed in a parametric form. This calculates the next point on the circle from the previous point.

When the formula is bashed about a bit with a little algebra it is found that only one SIN and COS need to be calculated for any particular circle. The calculations for each point involve only addition, subtraction and multiplication.

How this works in practice is shown

in Listing I. The procedure is passed the X and Y coordinates of the centre of the polygon along with the radius and number of sides.

A few constants are first calculated and the main loop between lines 240 to 300 calculates and draws the points. This results in a polygon being produced very quickly.

In order to see the procedure in action lines 10 to 150 generate a number of polygons centered on the same point. They will be drawn in black on a coloured background chosen at random.

The polygon procedure may be culled

By MIKE COOK

and used in your own programs. However it has been trimmed for speed. To do this meant using integer values whenever possible.

This introduces a slight rounding error as the last point is not precisely expressed and so the error is passed onto the next point. It is normally so small as to be unnoticeable.

However if the polygon is so large that it strays off the screen the error could be such that the last point will not coincide exactly with the first point. It will be one pixel out.

If this is a problem, convert all the variables inside the loop in lines 240 to 300 from integer to real, by removing the % sign.

5 REM HIGH SPEED POLYGONS - Mike Cook

```
10 MODE 0
20 BLACK=TRUE
30 WHITE=FALSE
40 VDU 19,1,0,0,0,0
50 REPEAT
60 SX=30
70 FOR NZ=3 TO 10
80 VDU 19,0,RND(6),0,0,0
90 IF NZ=10 THEN NZ=30
100 FOR RX=30 TO 500 STEP SX
110 PROC_POLY(640,512,RX,NZ)
120 NEXT
130 CLS
140 NEXT
150 UNTIL BLACK=WHITE
160 DEF PROC_POLY(XX,YY,RX,NZ)
170 LOCAL LXX,LYZ,C,TEX,TYX,C1,S1,AX
180 C=2*PI/NZ
190 C1=COS(C)
200 S1=SIN(C)
210 LXX=XX+RX
220 LYZ=YY
230 MOVE LXX,LYZ
240 FOR AX=1 TO NZ
250 TEX=XX+(LXX-XX)*C1-(LYZ-YY)*S1
260 TYX=YY+(LXX-XX)*S1+(LYZ-YY)*C1
270 DRAW TEX,TYX
280 LXX=TEX
290 LYZ=TYX
300 NEXT
310 ENDPROC
```

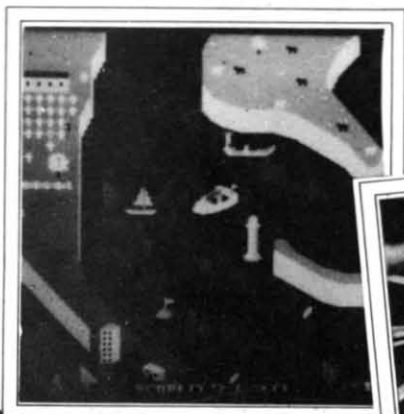
Listing I

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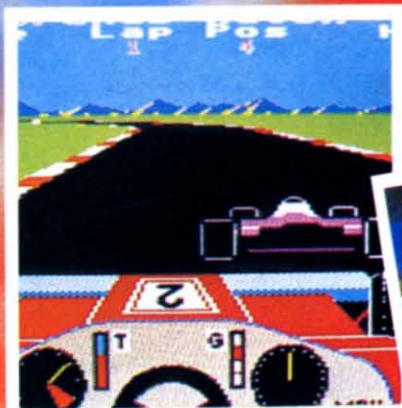
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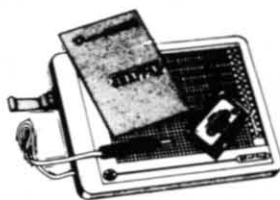
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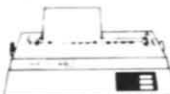
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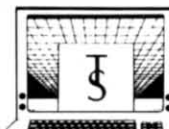
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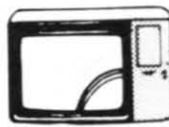
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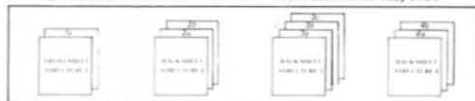
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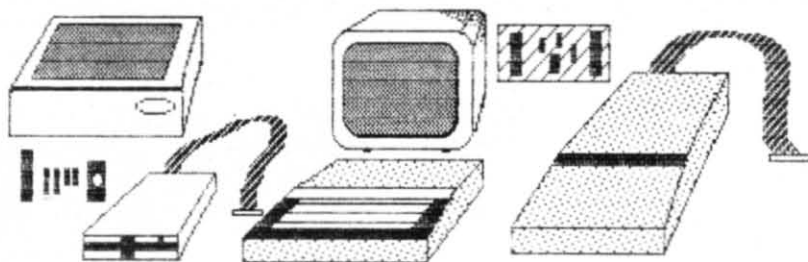
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**KEVIN EDWARDS concludes
his disc load/save routines**

SAVING GRACE

IN the last issue I explained how data could be loaded from disc into memory without upsetting the memory locations &E00 to &1100. This allows large programs such as adventures to be easily loaded from disc.

However there is little point in loading to &E00 if you cannot save from it, so this month we'll concentrate on that.

At this point I would advise you to refresh your memory by reading through last month's article on loading. This gives information on how to program the Floppy Disc Controller (FDC) - it is this which allows data to be passed to and from the disc.

The save routine is fairly similar to the load routine with the addition of a routine to write to the disc.

The command to read and the command to write are very similar. This means that integrating the save command into the existing routine is fairly straightforward.

All that is needed is a method of indicating to the program whether it is reading or writing. The method used was to set up a flag in zero page at &8F. This location is 0 when reading and &FF when writing.

The main load/save routine checks this byte and issues the appropriate command to the FDC. The Non Maskable Interrupt (NMI) routine checks the byte and will read or write a byte from or to the FDC accordingly.

The additional parameters for the write operation are the same as the read operation. They consist of the track address, sector address and the sector size - the sector size is 256 bytes for normal disc formats.

Once all the commands have been

sent to the FDC, the required operation will be executed. As with the load routine, an NMI occurs when data is to be sent to or from the disc.

Therefore the data to be saved must be sent to the FDC when requested. This is done by writing the byte to be saved to location &FE84.

It should be noted that the 8271 FDC will not allow you to write data to any disc that has a write protect tab on it. Any attempt to write to such a disc will cause the operation to be aborted and an NMI to be generated.

The NMI routine checks to see if an error has occurred, displaying the appropriate error message if so.

The Acorn DFS allows up to 31 files per drive. The files are stored one after another starting at track 0 sector 2. New files are usually tagged onto the end of the previous files until the disc is filled or the 31 files are used.

When a file is deleted a gap will be left. Any programs saved to the disc will be slotted into this gap if they fit, otherwise they are put at the end of the other files.

Fortunately the DFS has a *COM-PACT command which shuffles all of the files down the disc to make use of the empty sectors.

When a new file has been saved, the directory of the disc must be updated accordingly. This involves inserting the file name and file attributes - load and execution addresses, length and start sector - into the directory.

Unfortunately, the memory required to do this is more than we have available below &E00 which presents a problem. Somehow, a new file must be created to accommodate the data we wish to save.

The problem can be solved by setting

up a dummy file using the DFS.

This dummy file is used as a shell which will eventually accommodate the new program. For example:

```
*SAVE "DUMMY1" 8000+6C00
```

This will save a dummy file of length &6C00 bytes. The length of the dummy file is very important, as it indicates to the saving routine how much data is to be saved to disc.

The 8000 in the example above corresponds to the Basic ROM start address. This number is not important and is only used to tell the DFS to start saving from location &8000.

In tape mode, the length of the program is given in the last block of the file like this:

```
EXAMPLE1 6D 6D33
```

This indicates that the program called EXAMPLE1 is &6D33 bytes long. To create a dummy file on disc to accommodate the program, we would have to enter the following in disc mode:

```
*SAVE "EXAMP1" 8000+6D33
```

Note that the file name has to be shortened for the disc system.

*OPT 1,2, in tape mode, will list the file attributes for any files which are loaded or saved.

The *INFO \$., in disc mode will give the file attributes for the \$ directory of the currently selected drive. These commands are useful for finding the load and execution addresses of files. More detail of the above commands can be found in the User Guide and disc manuals.

The program to put the data into the dummy file is 100 per cent machine code and lives in pages &B and &C.

Unfortunately its position in memory

means any programs which re-program the function keys or re-define the character set will corrupt the save routine.

The integer variable K% is used to indicate the start address of the data to be saved. The end address of the file is calculated from the length of the dummy file + K% - 1. The dummy file is selected from a menu which consists of all the files on the disc, described in more detail later.

Now all problems have been solved and we are ready to save our data.

When you have finished typing in the program, save it. Next, run the program in the normal way. Now the machine code routine will have been assembled into memory starting at location &B00. The next thing to do is to save the object code. This is done by typing:

```
*SAVE "SAVER" B00 D00
```

You must now set up a boot file which sets K% to the save start address, changes the value of page and loads in the program SAVER.

To set up the file type:

```
*BUILD !BOOT
```

The number 1 will appear on the screen. Now enter the following:

```
*FX15
PAGE=&E00
NEW
KX=&E00
*L. SAVER
*TAPE
```

Pressing Esc will save the !BOOT file. To inform the micro that the !BOOT file is to be EXECed you must issue the *OPT 4,3 command.

Now this has been done the dummy file should be set up. Make sure the length of it is the same as the file you wish to transfer.

Booting the disc will set up the saver routine. Now the file to be transferred should be loaded into memory from tape. When this has been done the routine is called by typing in the following:

```
CALL&B00
```

After this has been done a menu of drive 0 files is displayed. Each file has an associated reference character.

Selecting a file is simply done by pressing the key corresponding to this character. It is this selected dummy file that the data is saved to, its length being used to indicate the amount of memory to be saved.

Therefore the start address is given

&80,&81	Low and high byte of the data source/destination.
&82	Offset for &80,&81
&83	Completion flag.
&84	Track number for read/write command.
&85	Sector start number.
&86	Number of sectors left to load/save.
&87	Number of sectors to be loaded/saved from the present track.
&88	Low byte of start sector.
&89	High byte of start sector.
&8A	Number of files on the disc. This is decremented when one of the file names is printed onto the screen.
&8B	Number of files on disc.
&8C	File number counter.
&8F	Indicates a read or write operation, 0 for load and &FF for save.
&600-&6FF	Contains the file names, these are loaded from track 0 sector 0.
&700-&7FF	Contains the file attributes (These are the load, save and execution addresses). Also included are the sector addresses for the files. These are loaded from track 0 sector 1.
&B00-&CFF	Contains the load/save subroutine.

Table 1: Memory usage

70	Select cassette filing system, 1200 baud.
80-100	Load sectors 0 and 1 from track 0 into locations &600-&7FF.
110	Indicate that further operations will be save.
120	Find out how many files are on the disc.
130-170	Display the file names.
180-190	Wait for a valid selection.
200-240	Find start sector for selected file.
250	Returns back to Basic if the disc contains no files.
260-300	Calculate the track and sector address for the file.
310	Copy the start address into &80,&81.
320	Store the track, sector and number of sectors to be loaded in zero page.
330	Change &D00-&D02 to a JMP instruction.
340	Set save/load address index register to 0.
350	Select non DMA mode.
360	Turn drive 0 on.
370	Wait until drive is at operation speed.
380	Seek to track 0.
390-450	Calculate the number of sectors to be loaded/saved from the current track.
460-470	Wait until drive is at operation speed before issuing the load/save command.
480	Wait until command is complete.
490-500	Test to see if all of the sectors have been saved or loaded.
510	Print a carriage return before returning to Basic.
520-590	Issues a load or save command to the 8271.
610-640	Routine to turn the drive on.
650-660	Reads the drive status register until the drive is ready for operation.
680-710	Selects the non DMA mode.
720-730	8271 parameter routine.
740	8271 command routine.
760-790	Puts a JMP instruction at the start of the normal NMI routine, so that my own NMI routine is executed.
800	Saves A and Y on the stack.
810	Tests to see if the interrupt generated is a non DMA request.
820	Tests to see if the operation is load or save.
830	Reads a byte from disc and saves it in main store.
840	Reads a byte from main store and saves it on the disc.
850	Increment the main store memory address used for the save and load routines.
860	Restore the A and Y registers and exits the NMI routine.
870	Check to see if the 8271 has caused the NMI.
880	Check to see if the interrupt was generated because of an error.
890	If no error has occurred, set the completion flag.
900-910	In the case of an error, print an error message.

Table 2: Program description

From Page 169

by K% and the end address is given by the value of (K% + length - 1).

The routine can be aborted by pressing Break. This should only be done before a selection has been made.

If Esc is pressed the menu selection will be disabled and Break must be pressed.

Under no circumstances should you press Break when a file is being saved or when you are changing the disc. If this is done, the disc may be corrupted.

It should be noted that to stop the first

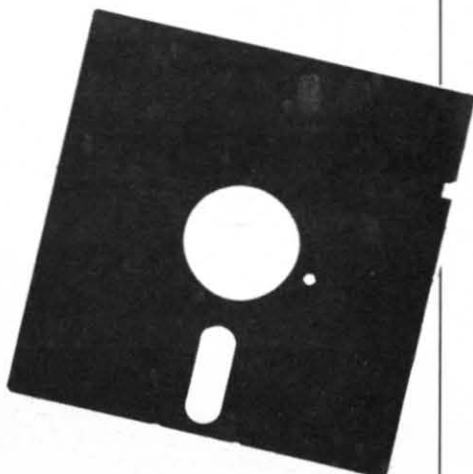
few file names scrolling off the top of the screen, a VDU 14 command has been issued. This means that Shift must be pressed to reveal the remainder of the file names, if any.

Once all of the files have been transferred to disc you can use the boot file from the previous article to load them back into memory when required.

The program uses part of page 0 and all of pages 6 and 7.

Table I is a brief description of the memory usage.

Table II is a program description for the save routine.



```

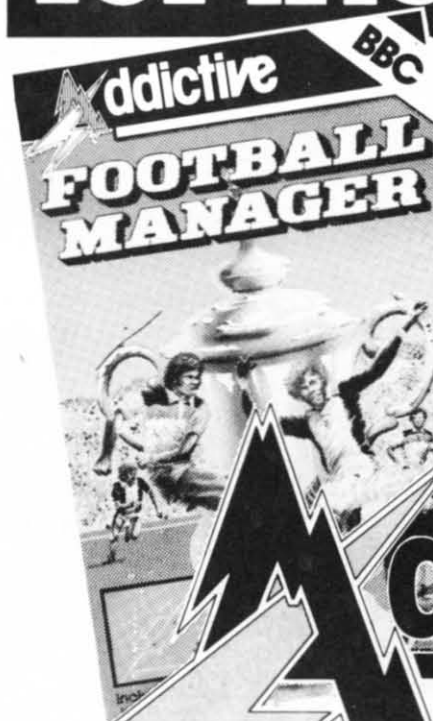
10 REM Disc Save
20 REM By Kevin Edwards
30 REM (c) The Micro User
40 K%=&E00
50 FOR L=0 TO 255: P%=&B00
60 OPTL
70 LDA#&BC:LDX#12:JSR&FFF4
80 LDA#6:STA#81:LDA#0:STA#8F:STA#B
0
90 TAX:LDY#2:JSRMain_save_load
100 .Ready LDA#81:CMP#8:BNEReady
110 LDA#FF:STA#8F:LDA#0:STA#8C
120 LDA#705:LSRA:LSRA:LSRA:BEQEmpty
:STA#8A:STA#8B
130 LDA#12:JSR&FFEE:LDA#14:JSR&FFEE
:LDX#0
140 .Loop1 LDY#0:LDA#8C:CLC:ADC#65:
JSR&FFEE:LDA#32:JSR&FFEE
150 .Loop2 LDA#60B,X:JSR&FFEE:INX:I
NY:CPY#7:BNELoop2
160 INX:INC#8C:JSR&FFE7:DEC#8A:BNE
oop1
170 LDA#15:JSR&FFEE:LDA#63:JSR&FFEE
180 .Get_key JSR&FFE0
190 TAX:SEC:SBC#65:TAY:CMP#8B:BCSGe
t_key
200 TAX:JSR&FFEE:INY:TYA:ASLA:ASLA:
ASLA:TAX:DEX
210 LDA#70B,X:STA#8B:DEX:LDA#70B,X:
AND#3:STA#89
220 DEX:LDA#70B,X:TAY
230 DEX:LDA#70B,X:BEQCalc_track
240 INY:JMPCalc_track
250 .Empty RTS
260 .Calc_track LDX#0
270 .Next_track LDA#89:BNEGreater
280 LDA#88:CMP#10:BCCMain_save_load
1
290 .Greater SEC:LDA#88:SBC#10:STA#
88
300 LDA#89:SBC#0:STA#89:INX:JMPNext
_track
310 .Main_save_load1 PHA:LDA#42C:ST
A#80:LDA#42D:STA#81:PLA
320 .Main_save_load STX#84:STA#85:S
TX#86
330 JSRNMI_change
340 LDA#0:STA#82
350 JSRNon_DMA_mode
360 JSRDrive_on
370 JSRWait_for_speed
380 LDA#69:JSRCommand:LDA#0:JSRPar
ameter
390 .Next LDA#0:STA#83:LDA#85:BEQNo
real
400 LDA#10:SEC:SBC#85:CMP#86:BCSSma
ll
410 STA#87:LDA#86:SEC:SBC#87:STA#86
:JMPNormal1
420 .Small LDA#86:STA#87:BNELast
430 .Normal LDA#86:CMP#11:BCSMore:S
TAX#87
440 .Last LDA#0:STA#86:BEQNormal1
450 .More SEC:SBC#10:STA#86:LDA#10:
STA#87
460 .Normal1 JSRWait_for_speed
470 JSRSave_Load
480 .No_end LDA#83:BEQNo_end
490 LDA#0:STA#85
500 INC#84:LDA#86:BNENext
510 JSR&FFE7:RTS
520 .Save_Load LDA#8F:BNEsav
530 LDA#53:BNESelected
540 .Sav LDA#4B
550 .Selected JSRCommand
560 LDA#84:JSRParameter
570 LDA#85:JSRParameter
580 LDA#20:CLC:ADC#87:JSRParameter
590 RTS
600 .Drive_on
610 LDA#3A:JSRCommand
620 LDA#23:JSRParameter
630 LDA#4B:JSRParameter
640 RTS
650 .Wait_for_speed LDA#6C:JSRComm
and:LDA#FEB1:AND#4:BEQWait_for_speed
660 RTS
670 .Non_DMA_mode
680 LDA#3A:JSRCommand
690 LDA#17:JSRParameter
700 LDA#C1:JSRParameter
710 RTS
720 .Parameter PHA
730 .Busy LDA#FEB0:AND#20:BNEBusy:
PLA:STA#FEB1:RTS
740 .Command BIT#FEB0:BNICCommand:ST
A#FEB0:RTS
750 .NMI_change
760 LDA#4C:STA#D00
770 LDA#NMI_routine MOD 256:STA#D01
780 LDA#NMI_routine DIV 256:STA#D02
790 RTS
800 .NMI_routine PHA:TYA:PHA
810 LDA#FEB0:AND#4:BEQCheck
820 LDY#82:LDA#8F:BNEPut
830 .Get LDA#FEB4:STA#80,Y:JMPInc
_loc
840 .Put LDA#80,Y:STA#FEB4
850 .Inc_loc INY:STY#82:BNEEnd:INC#
81
860 .End PLA:TYA:PLA:RTI
870 .Check LDA#FEB0:AND#8:BEQEnd
880 LDA#FEB1:AND#1E:BNEDisc_error
890 LDA#1:STA#83:BNEEnd
900 .Disc_error JSR&FFE7:BRK:BRK
910 .Error_message
920 INEXT
930 $Error_message="Disc Error"+CHR
#0
940 END

```

This listing is included in this month's cassette tape offer. See order form on Page 237.

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Among the many other options offered are seven skill levels ranging from beginner to genius. If you start as a beginner and do well, your rating is adjusted automatically at the end of the season. The most crucial decision affecting your team's performance, however, involves the selection of players and it is based on the attributes of the two opposing teams. Their energy, morale, defence and attacking strength are valued on a scale of points, and players are chosen according to positional skills and energy they can bring to the team. True to life, players' energy is depleted after a game and restored after a rest.

Having settled all the details, you can then sit back and watch the game – a short, animated sequence showing the 'highlights'. Scores, injuries and new league placings are all displayed at the end.

The combination of graphic action and informed decision-making distinguishes Football Manager from many other strategy games and the scope and careful presentation of the program make it entertaining and absorbing.

(Acorn Programs – August/September 1984)

DIVISION ONE

As Automata have also proved, Addictive Games has shown that it is possible to write excellent programs in Basic – Football Manager started life as a ZX81 program ages ago and is still going strong.

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Apart from that, it only remains to summarise the game for those people who don't know it. As a football manager you choose the team by the players, deciding who to play, keeping morale high and basically living out your footballing fantasies as you try to move your team up the divisions.

Matches are decided according to a vast number of factors, only one of which is luck, and you get to see the highlights of each game.

Quite honestly, John, I think you're going to be over the moon about this one unless you're strictly TT on footballing matters in which case you'll probably be sick as a parrot, squire.

(Popular Computing Weekly)

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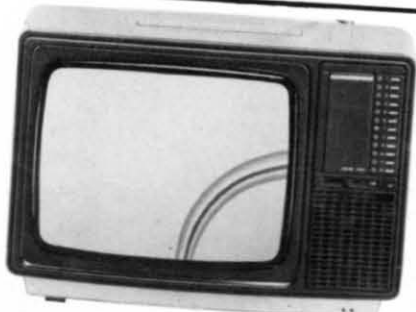
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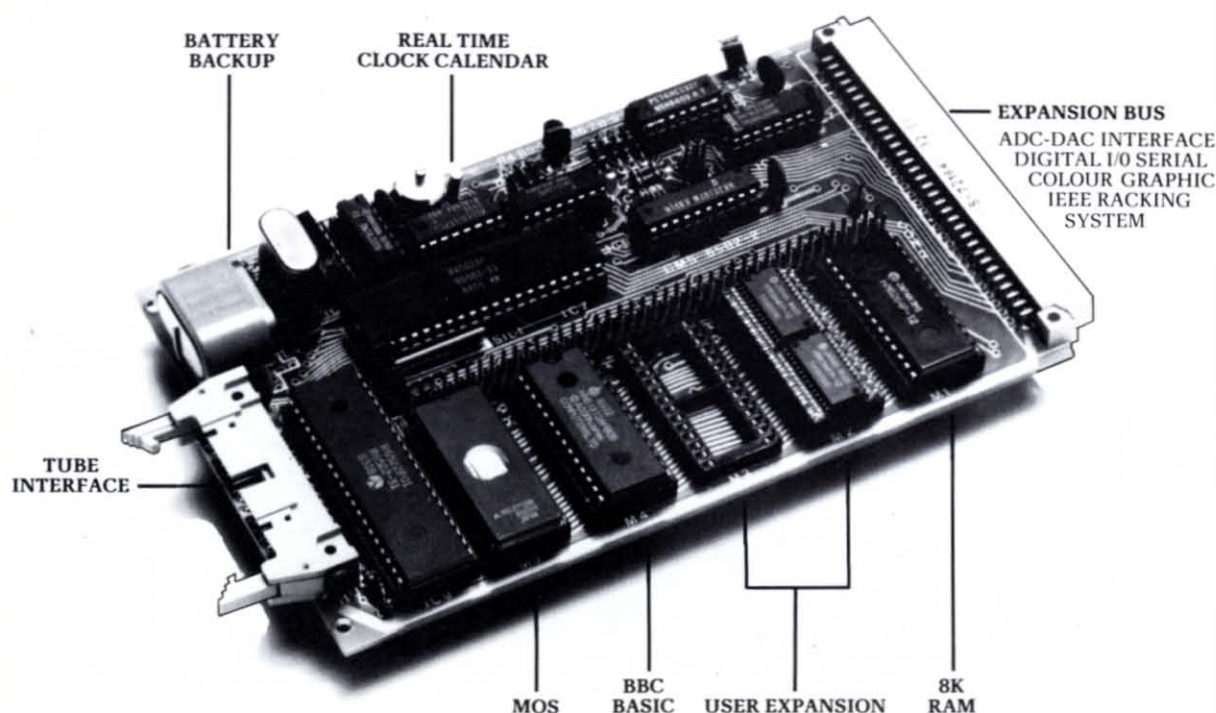


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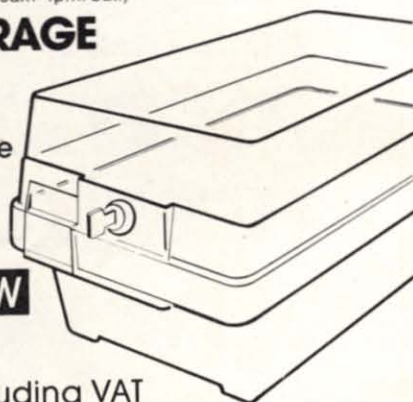
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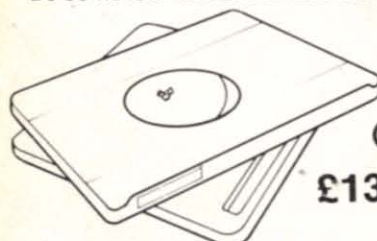
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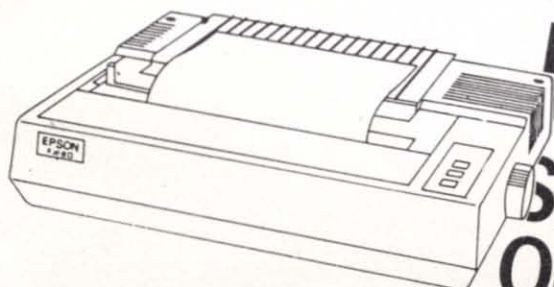
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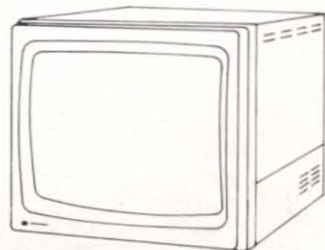
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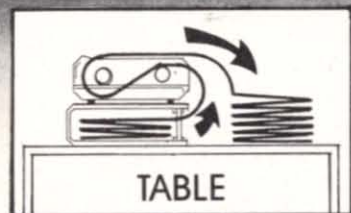
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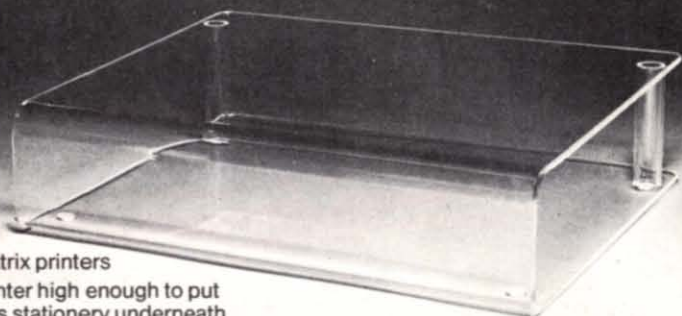


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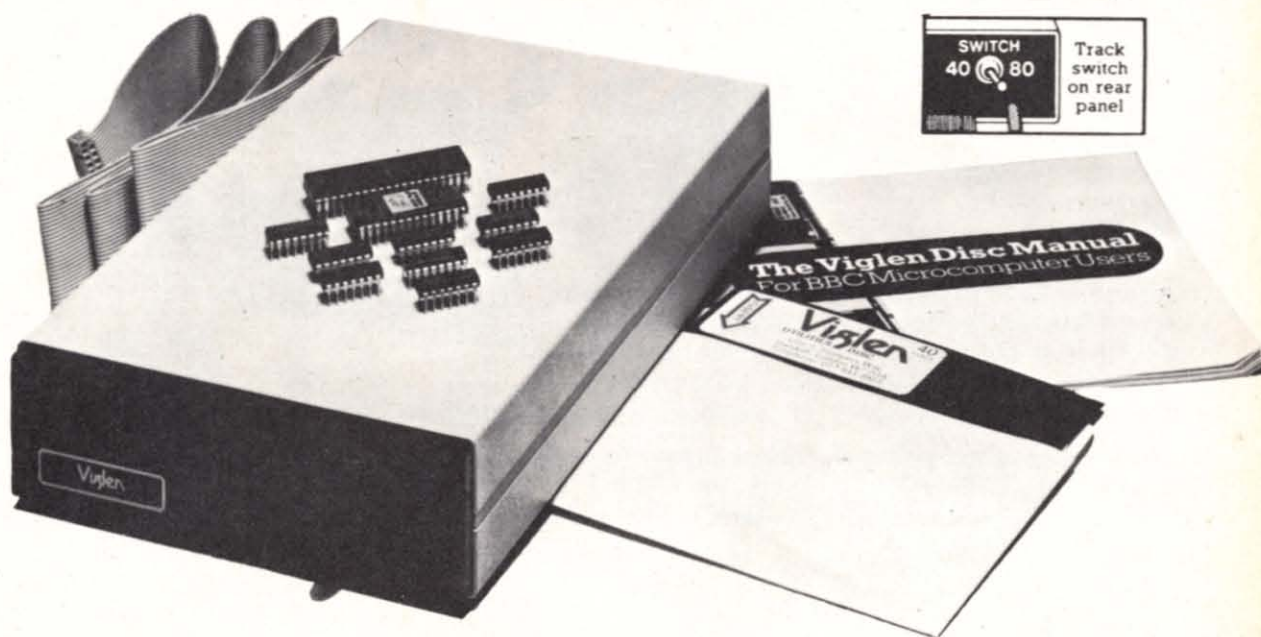
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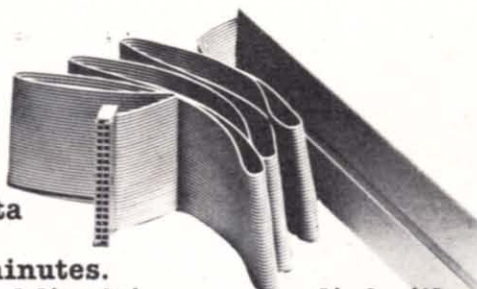
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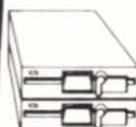
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MU127

CATALOG

ROBIN NIXON shows how to keep tabs on your disc files — in colour, too

CATALOG, as its name suggests, is a versatile disc cataloguing program that allows you to choose the files you wish to load from disc simply and quickly.

Not only that, it offers rather sophisticated facilities such as formatted listings and tables of procedures and functions. It has been tested on Acorn, Amcom and Watford DFS.

When you run the program each file on the disc is displayed, together with its directory.

If the file is unlocked it is shown in white. If it is locked it appears in yellow.

The file currently selected is highlighted in blue. By use of the cursor keys you can move the highlight to choose the file you wish.

A command table is displayed at the top of the screen.

Once you've highlighted the file you want, pressing the keys shown allows you to load, chain, lock, unlock and delete files at will, as well as to change drive. Escape causes the disc to be recatalogued.

You can also choose to have a formatted listing, or display the functions and procedures in a program together with their line numbers.

I suggest you put Catalog on all your discs, creating the following !BOOT file with *BUILD:

CH. "CATALOG"

and, of course, do a:

*OPT 4 3

on the disc. You'll then be able to boot into Catalog with Shift+Break.

One final point — the listing shown is for Basic II. For Basic I simply change each occurrence of OPENUP to OPENIN (lines 1050, 1350).

PROGRAM STRUCTURE

- 180-190 Display the instructions.
- 200-380 Main program loop.
- 1520-1560 Contain the data for tokenised keywords.

PROCEDURES

Switches off output to the screen, then catalogues the disc in the currently selected drive. The micro then calls PROCLOADSECT which loads the catalogue from disc and puts it in memory locations &7700 to &8000. The filenames stored there are then read by PROCCAT and printed across the screen four at a time preceded by their directory typed in red and the filename itself in white — or yellow if locked.

Reads the disc's TITLE (if any) and the number of files on disc from the data already loaded into memory, and displays them at the top of the screen, along with the current drive number.

Waits for input from either the keyboard or the paddle buttons.

Is called by PROCGET. When pressed, paddle button zero selects between files, and button one chains in the selected file.

Is called by PROCCAT and checks to see whether or not a file is locked and, if so, prints it in yellow. Otherwise the file is printed in white.

LOADS a selected file.

CHAINS a selected file.

LOCKS a selected file.

UNLOCKS a selected file.

DELETES a selected file, but first asks if you are sure.

Alternates between drives 0 and 1.

Is used by the file-handling procedures to discover the directory type of a file.

Sets the delay speed of the keyboard back to normal when a file is CHAINED or LOADED.

Gives a formatted listing of any program held on disc.

Used by PROCFORMLIST to check whether a colon is between quotation marks. If so it does not divide the line.

Called by PROCFORMLIST, decodes the line numbers immediately following GOTOS and GOSUBS.

Finds all the functions and procedures contained in a listing and gives their line numbers.

Uses PROCRI to remove any spaces between the line number and the start of a line. It also removes any spaces between a DEF and either PROC or FN.

Removes spaces from a line.

Is called by PROCCAT and uses a machine code routine to load in the first four sectors of a disc at &7700.

Is called by PROCFORMLIST. LS holds the line to be printed. If it is too long then it is split.

Is called by PROCFORMLIST if a token for a keyword has been recognised. It then checks whether adding the keyword to the line would make it too long and splits the line accordingly.

✓ PROCCAT

✓ PROCTITLE

✓ PROCGET

✓ PROCADVAL

✓ PROCLOCK

✓ PROCLOAD

✓ PROCCHAIN

✓ PROCLOCK

✓ PROCUNLOCK

✓ PROCDELETE

✓ PROCCHANGE

✓ PROCSS

✓ PROCFX

✓ PROCFORMLIST

✓ PROCFL

✓ PROCGO

✓ PROCPROCS

✓ PROCRS

✓ PROCRI

✓ PROCLOADSECT

✓ PROCPLS

✓ PROCLNG

Catalog listing

From Page 185

```

10 REM (c) Micro User
100 *TV0
110 MODE7
120 *FX4,1
130 *FX11,20
140 *FX12,20
150 VDU23;8202;0;0;0;DIMCLIX 50
160 DIMCAT$(61),T$(128),NW$(61):CLS
:DNX=0:SCX=32066:RESTORE1520:FORZX=1T
0128:READT$(ZX):NEXT:L6LX=0
170 PCX=0:PRINT "CHR#148STRING$(39,
CHR#96);
180 PRINTCHR#131"L"CHR#135"LOAD"SPC
2CHR#131"C"CHR#135"CHAIN"SPC3CHR#131"
F"CHR#135"FORMATTED LISTING"CHR#131"K
"CHR#135"LOCK"SPC2CHR#131"U"CHR#135"U
NLOCK"SPC2CHR#131"P"CHR#135"LIST PROC
S & FNG";
190 PRINTCHR#131"N"CHR#135"DRIVE"SP
C1CHR#131"D"CHR#135"DELETE"SPC2CHR#13
1"ESC"CHR#135"CATALOGUE DISK"CHR#148
STRING$(39,CHR#112);
200 PROCCAT:ON ERROR RUN
210 D1X=SCX+PCX:D2X=? (D1X)
220 ? (8CX+PCX)=132
230 *FX15,1
240 PROCGET:IFG$="L"ORG$="C" PROCFX
:60T0260
250 IFG$(<)"D"ANDG$(<)"K"ANDG$(<)"U"AN
DG$(<)"U"ANDG$(<)"N"AND(G$(CHR#136ANDG$
)CHR#139) GOTO240
260 IFG$="L" MODE7:PROCLOAD:END
270 IFG$="C" PROCCCHAIN:END
280 IFG$="D" PROCDELETE:CLS:GOTO170
290 IFG$="K" PROCCLK:CLS:GOTO170
300 IFG$="U" PROCUNLOCK:CLS:GOTO170
310 IFG$="N" PROCDDIVE:CLS:GOTO170
320 IFG$="F" PROCFORMLIST:CLS:GOTO1
70
330 IFG$="P" PROCPCXS:CLS:GOTO170
340 IFG$=CHR#136 PCX=PCX-10:IFPCX<0
PCX=LCX+10-10
350 IFG$=CHR#137 PCX=PCX+10:IFPCX=1
0*LCX PCX=0
360 IFG$=CHR#138 PCX=PCX+40:IFPCX>=
10*LCX PCX=(PCX/10)MOD4+10
370 IFG$=CHR#139 PCX=PCX-40:IFPCX<0
PCX=PCX+(LCX-LCXMOD4)*40DIV4+40*-1
(LCXMOD4)>0:IF(PCX#4)>(LCX-1)*40) P
CX=PCX-40
380 ? (D1X)=D2X:GOTO210
390 *FX4,0
400 END
410 DEFPROCCAT:PSX=0:NNX=0:NFX=0:PR
INTTAB(0,11)*:FX3,2
420 ONERRORGOTO1190
430 *
440 LCX=0:7&80=DNX:PROCLOADSECT

```

```

450 IF!&7900=&AAAAAAA AND !&7904=&
AAAAAAA NNX=1 ELSE NNX=0
460 N1X=0:FX3,0
470 PROCTITLE:PRINTTAB(0,8)*:
480 FORDIX=0T030:IFPSX=INT((?&7805*
1)/8+NNX*(?&7A05/8)) GOTO550 ELSE C1X
=D1X+31*N1X:F2X=0:F3X=0:T$="":FORC2X=
2T08:F1X=0:C1X=N1X*108+&7706+C1X*7+C
2X+C1X:CYX=?CX
490 IF(CYX)32ANDCYX<=ASC"z") T$=T$+
CHR#CYX:F1X=1:GOTO510 ELSE IF(CYX)>159
AND CYX<220) T$=T$+CHR#(CYX-128):F1X
=1:GOTO510
500 T$=T$+" ":IF F3X=0 F2X=C2X:F3X=
1
510 IFF1X=1 AND C2X>F2X AND F2X>0 F
3X=2
520 NEXT:IFF3X=2 OR LENT$=0 OR LEFT
$(T$,1)="" GOTO550
530 PRINTCHR#129;:D1X=? (CX+1):IFDI
X=0 PRINT " "; ELSE PRINTCHR#D1X;
540 PROCLOCK:CAT$(PSX)=T$:NW$(PSX)=
CX+1:PRINTT$:PSX=PSX+1
550 NEXT:IFNNX=1 AND N1X=0 N1X=1:GO
T0480 ELSE LCX=INT((?&7805*1)/8+NNX*(
?&7A05/8)):ENDPROC
560 DEFPROCLOCK:IF(? (CX+1)AND128 PR
INTCHR#131; ELSE PRINTCHR#135;
570 ENDPROC
580 DEFPROCLOAD:PROCCS:PRINTTAB(8,1
0)CHR#141CHR#132"LOADING"CHR#131S:PR
INTTAB(8,11)CHR#141CHR#132"LOADING"CH
R#131S:L$="LOAD "+CHR#34+S$+CHR#3
4+CHR#13:FORTX=1T08+LENS$:YX=ASC(MID$
(L$,TX,1)):AX=138:YX=0:CALL&FF4:NEXT
:END
590 DEFPROCCHAIN:CLS:PROCCS:PRINTTA
B(8,10)CHR#141CHR#132"CHAINING"CHR#13
1S:PRINTTAB(8,11)CHR#141CHR#132"CHAI
NING"CHR#131S:CHAIN S$
600 DEFPROCSS:S$=CHR#(1?(NW$(PCX/10
))OR128)-128)
610 IFASC$=0 S$="" ELSE S$=S$+" "
620 S$=S$+CAT$(PCX/10):ENDPROC
630 DEFPROCUNLOCK:CLS:PROCCS:PRINTT
AB(7,10)CHR#141CHR#132"UNLOCKING "CHR
#131S:PRINTTAB(7,11)CHR#141CHR#132"U
NLOCKING "CHR#131S:$CLIX="*AC. "+S$:
YX=CLIX MOD256:YX=CLIX DIV256:CALL&FF
F7:FORX=1T04000:NEXT:ENDPROC
640 DEFPROCLOCK:CLS:PROCCS:PRINTTAB(
8,10)CHR#141CHR#132"LOCKING "CHR#131S
$:PRINTTAB(8,11)CHR#141CHR#132"LOCKIN
G "CHR#131S:$CLIX="*AC. "+S$+" L":YX
=CLIX MOD256:YX=CLIX DIV256:CALL&FF7
:FORX=1T04000:NEXT:ENDPROC
650 DEFPROCDDIVE:CLS:ONERRORVDU7:GO
T0730
660 IFDNX=0 DNX=1 ELSE DNX=0
670 PRINTTAB(7,10)CHR#141CHR#132"CH

```

```

ANGING TO"CHR#131"DRIVE ";DNX:PRINTTA
B(7,11)CHR#141CHR#132"CHANGING TO"CHR
#131"DRIVE ";DNX
680 $CLIX="* "+STR$(DNX):YX=CLIX M
OD256:YX=CLIX DIV256:CALL&FF7:ENDPRO
C
690 DEFPROCDELETE:CLS:PROCCS:PRINTT
AB(8,10)CHR#141CHR#132"DELETE"CHR#131
S$:PRINTTAB(8,11)CHR#141CHR#132"DELET
E"CHR#131S$
700 PRINTTAB(10,13)CHR#141"ARE YOU
SURE? ":PRINTTAB(10,14)CHR#141"ARE YO
U SURE? ":G=GET:IFG<>ASC"Y"ANDG<>ASC"
Y" ENDPROC
710 ONERRORVDU7:GOTO750
720 CLS:PRINTTAB(8,10)CHR#141CHR#13
2"DELETING"CHR#131S$:PRINTTAB(8,11)CH
R#141CHR#132"DELETING"CHR#131S:$CLIX
="*DEL. "+S$:YX=CLIX MOD256:YX=CLIX D
IV256:CALL&FF7:FORX=1T04000:NEXT:END
PROC
730 *FX3,0
740 CLS:PRINTTAB(5,10)CHR#141CHR#13
2"DRIVE 1"CHR#131"is NOT CONNECTED!":
PRINTTAB(5,11)CHR#141CHR#132"DRIVE 1"
CHR#131"is NOT CONNECTED!":FORX=1T050
00:NEXT:GOTO760
750 CLS:PRINTTAB(7,10)CHR#141CHR#13
2S$CHR#131"is LOCKED!":PRINTTAB(7,11)
CHR#141CHR#132S$CHR#131"is LOCKED!":F
ORX=1T05000:NEXT
760 *FX3,2
770 *. 0
780 *FX3,0
790 RUN
800 DEFPROCTITLE:T$="":FORZX=&7700T
D&7707:T$=T$+CHR#7ZX:NEXT:FORZX=&7800
T087803:T$=T$+CHR#7ZX:NEXT:PRINTTAB(0
,0)T$:PRINTTAB(12,0):CHR#137CHR#156CH
R#129CHR#157CHR#132"DRIVE"CHR#131STR$
(DNX)SPC2CHR#156;
810 PRINTTAB(27,0):CHR#132CHR#157CH
R#135STR$(INT((?&7805*1)/8)+NNX*(?&7A
05/8))CHR#129"FILES":ENDPROC
820 DEFPROCFX:FX4,0
830 *FX11,30
840 *FX12,3
850 ENDPROC
860 DEFPROCGET
870 PROCADVAL(200)
880 IFG$(<)"* ENDPROC
890 IFADZ=1 G$=CHR#137:ENDPROC
900 IFADZ=2 G$="C":ENDPROC
910 GOTO870
920 DEFPROCADVAL(DLX):DTX=0
930 ADZ=ADVAL(0)AND3:G$=INKEY$(0):I
FADZ=0 AND G$="" PNTX=0:GOTO930
940 IFG$(<)"* ENDPROC
950 IFPNTX=0 PNTX=1:GOTO980

```




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Catalog listing

From Page 186

```

960 Z1Z=0:REPEATZ1Z=Z1Z+1:IF(ADVAL
0)AND3)=0 PNTZ=0:Z1Z=200:QTZ=1
970 UNTILZ1Z=200:IFQTZ=1 GOTO930
980 ENDPROC
990 DEFPROCFORMLIST:CLS:PRINTTAB(8,
10)CHR#141CHR#132"FORMATTED LISTING":
PRINTTAB(8,11)CHR#141CHR#132"FORMATE
D LISTING"
1000 ONERROR VDU7:GOTO1170
1010 PROCSS:PRINT"CHR#141CHR#130SPC7
"of file : "CHR#133$:PRINTCHR#141CHR#
130SPC7"of file : "CHR#133$
1020 PRINT"CHR#141CHR#129SPC5"Do you
want a print-out?":PRINTCHR#141CHR#1
29SPC5"Do you want a print-out?"
1030 PNZ=0:P=GET$:IFP$="Y"ORP$="y"
CLS:VDU2,1,14:PRINTSPC6$':PNZ=1:GOT
D1050
1040 CLS:VDU14
1050 BZ=OPENUP($$)
1060 BZ=BGET#BZ:REPEAT:GZ=BGET#BZ:G1
Z=BGET#BZ:L$=STR$(BZ*256+G1Z)+ " ":IFL
ENL$<6 L$=STRING$(6-LENL$," ") +L$
1070 IFL$="65534 " GOTO1170
1080 PRINTL$:L$="":FLZ=0:GZ=BGET#BZ
:FLZ=0:FORYZ=1TOGZ-3:G1Z=BGET#BZ
1090 IFG1Z=&8B OR G1Z=&8C PROCPLS:L$=
" ":LGLZ=0:PRINT"SPC6;
1100 IFG1Z>127 IF FLZ=0 AND LEN(L$+T
$(G1Z-127))<30 L$=L$+T$(G1Z-127) ELSE
IFG1Z>127 AND FLZ=0 PROCCLNG
1110 IFG1Z=141 PROC60 ELSE IFG1Z>127
AND FLZ=1 L$=L$+CHR#G1Z
1120 IFG1Z=58 AND G1Z=0 PROCPLS:L$="
":LGLZ=0:PRINT"SPC6;
1130 IFG1Z>31 AND G1Z<127 L$=L$+CHR#
G1Z
1140 IFG1Z=34 PROCFL
1150 IFG1Z=13 YZ=GZ-3
1160 NEXT:PROCPLS:PRINT:LGLZ=0:UNTIL
EOF#BZ
1170 CLOSE0:VDU3:FX15,1
1180 PRINT"CHR#141CHR#133CHR#136SPC2
"Press SHIFT to return to menu":PRINT
CHR#141CHR#133CHR#136SPC2"Press SHIFT
to return to menu":REPEATUNTIL#KEY(
-1):RUN
1190 *FX3,0
1200 CLS:PRINTTAB(12,10)CHR#129CHR#1
41"DISK ERROR":PRINTTAB(12,11)CHR#129
CHR#141"DISK ERROR":PRINTTAB(8,14)CHR
#132CHR#141"INSERT ANOTHER DISK":PRIN
TTAB(8,15)CHR#132CHR#141"INSERT ANOTH
ER DISK"*****:GOTO1180
1210 DEFPROCFL:IFFLZ=0 FLZ=1 ELSE FL
Z=0
1220 ENDPROC
1230 DEFPROC60:G2Z=BGET#BZ:G3Z=BGET#

```

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# MEDMON	# stanlet	# K	# DISC
# WORCH	# BASCH	# UNLOCK	# BUFFER
# READ2	# WSET+	# KEYS	# VDU23
# SDUMP2	# SDUMP1	# SCUMP	# GENRTR
# EUCHESD	# ELSDN6H	# ENVGEN	# CH50
# WSET	# MAGDOWN	# TEST	# FORM40

```

BZ:G4Z=BGET#BZ:IFG2Z=68 L$=L$+STR$(G3
Z+(G4Z-64)*256)
1240 IFG2Z=80 L$=L$+STR$(G3Z-64+G4Z*
256)
1250 IFG2Z=84 L$=L$+STR$(G3Z-64+(G4Z
-64)*256)
1260 IFG2Z=116 L$=L$+STR$(64+G3Z+(G4
Z-64)*256)
1270 IFG2Z=100 OR G2Z=96 L$=L$+STR$(
128+G3Z+(G4Z-64)*256)
1280 ENDPROC
1290 DEFPROCPCRS:CLS:PROCSS:PRINTTA
B(4,10)CHR#141CHR#132"LIST PROCEDURES
& FUNCTIONS":PRINTTAB(4,11)CHR#141CH
R#132"LIST PROCEDURES & FUNCTIONS"
1300 ONERRORVDU7:GOTO1170
1310 PRINT"CHR#141CHR#130SPC7"of fil
e : "CHR#133$:PRINTCHR#141CHR#130SPC
7"of file : "CHR#133$
1320 PRINT"CHR#141CHR#129SPC5"Do you
want a print-out?":PRINTCHR#141CHR#1
29SPC5"Do you want a print-out?"
1330 P=GET$:IFP$="Y"ORP$="y" CLS:VD
U2,1,14:PRINTSPC6$':GOTO1350
1340 CLS:VDU14
1350 BZ=OPENUP($$):GZ=BGET#BZ:REPEAT
1351 G1Z=BGET#BZ:IF EOF#BZ THEN GOTO
1390
1352 G2Z=BGET#BZ:LINZ=G1Z*256+G2Z:NL
Z=BGET#BZ:PROCSS:IF(G1Z=&DD AND G2Z=&A4) GOTO1360
ELSE FORTZ=1TO(NLZ-3)-CTZ:GZ=BGET#BZ
:NEXT:GOTO1390
1360 P$="":PRINTLINZ " ":IFG2Z=&F2
PRINT"PROC "; ELSE PRINT"FN ";
1370 GZ=BGET#BZ:IFGZ=0 OR GZ=13 OR G
Z=32 OR GZ=58 GOTO1380 ELSE P$=P$+CHR
#GZ:GOTO1370
1380 PRINTP$:IF (NLZ-LENP$)-CTZ=5 GO
TO1390 ELSE FORTZ=1 TO(NLZ-LENP$)-5)
-CTZ:GZ=BGET#BZ:NEXT
1390 UNTIL EOF#BZ:GOTO1170
1400 DEFPROC60:CTZ=0:PROC61:G1Z=GTZ:
IFG1Z=&DD PROC61:G2Z=GTZ:CTZ=CTZ-1:EN
DPROC
1410 G2Z=0:ENDPROC
1420 DEFPROC61:REPEATGTZ=BGET#BZ:CTZ
=CTZ+1:UNTILGTZ<>32:ENDPROC

```

```

1430 DEFPROCLOADSECT:RESTORE1440:FOR
Z=0TO38:READ?(&C00+Z):NEXT:CALL&C00
:ENDPROC
1440 DATA &A5,&80,&8D,&1D,&0C,&A9,&0
4,&85,&81,&A9,&7F,&A0,&0C,&A2,&1D,&20
,&F1,&FF,&EE,&1F,&0C,&EE,&25,&0C,&C6,
&81,&D0,&ED,&60,&00,&00,&77,&00,&00,&
03,&53,&00,&00,&21
1450 DEFPROCPLS
1460 IF(LENL$+LGLZ)>34 PRINTLEFT$(L$
,34-LGLZ)::GOTO1470 ELSE PRINTL$:LGL
Z=LENL$:ENDPROC
1470 L$=RIGHT$(L$,LENL$-(34-LGLZ)):L
GLZ=0:IF PNZ PRINT
1480 PRINTSPC6;:GOTO1460
1490 DEFPROCCLNG:FLGZ=0:IFLENL$>34 F
LGZ=1
1500 PROCPLS:L$=T$(G1Z-127):IFFLGZ=0
PRINT"SPC6;:LGLZ=0
1510 ENDPROC
1520 DATA AND,DIV,EOR,MOD,OR,ERROR,L
INE,OFF,STEP,SPC,TAB(,ELSE,THEN,,OPEN
IN,PTR,PAGE,TIME,LOMEN,HIMEN,ABS,ACS,
ADVAL,ASC,ASN,ATN,BGET,COS,COUNT,DEG,
ERL,ERR,EVAL,EXP,EXT,FALSE,FN,GET,INK
EV,INSTRI,INT,LEN
1530 DATA LN,LOG,NOT,OPENUP,OPENOUT,
PI,POINT(,POS,RAD,RND,SGN,SIN,SQR,TAN
,TO,TRUE,USR,VAL,VPOS,CHR$,GET$,INKEY
$,LEFT$(,MID$(,RIGHT$(,STR$,STRING$(,
EOF,AUTO,DELETE,LOAD,LIST,NEW,OLD,REN
UMBER,SAVE,,PAGE,,,
1540 DATA SOUND,BPUT,CALL,CHAIN,CLEA
R,CLOSE,CLG,CLS,DATA,DEF,DIM,DRAW,END
,ENDPROC,ENVELOPE,FOR,GOSUB,GOTO,GCOL
,IF,INPUT,LET,LOCAL,MODE,MOVE,NEXT,ON
,VDU,PLOT,PRINT,PROC,READ,REM,REPEAT,
REPORT,RESTORE,RETURN,RUN,STOP,COLOUR
,TRACE,UNTIL
1550 DATA LET,LOCAL,MODE,MOVE,NEXT,O
N,VDU,PLOT,PRINT,PROC,READ,REM,REPEAT
,REPORT,RESTORE,RETURN,RUN,STOP,COLOU
R,TRACE,UNTIL
1560 DATA WIDTH,OSCLI

```

This listing is included in this month's cassette tape offer. See order form on Page 237.



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**The question we're most frequently asked is
"How do I know if I've got Basic I or II and
what's the difference?"**

Edward Johns has the answers.

THERE are now five versions of Basic out for the BBC Micro. Three of them only work with the second processors and the other two are used in the standard BBC Micro. It is the latter versions that I will be concentrating on in this two-part article.

To find out which version of Basic is in your micro press Break and type REPORT, followed by Return.

A copyright message will be displayed along with the year 1981 or 1982. It is this year that indicates which version of Basic you have - 1981 for a Basic I and 1982 for Basic II.

A quick way to check which version of Basic is in use while a Basic program is running is to peek the Basic ROM.

The obvious location to check is the one which contains the final digit of the copyright year - this is different on the two Basics.

The location will contain the Ascii of 1 in the 1981 of Basic I and the Ascii of 2 in the 1982 of Basic II.

The following line can be added to any program to test which version of Basic is present. The variable *version* will be 1 for Basic I and 2 for Basic II.

```
10 IF 7&8015=ASC"1" THEN version=1  
ELSE version=2
```

All of the new BBC Micros have the 1982 Basic, the main feature of which is that several of the minor bugs in Basic I have been ironed out.

As well as tidying up the bugs, Acorn has also added six new commands, four

of which are in the assembler. We'll leave the assembler until next month, and concentrate now on the changes likely to affect the ordinary user.

One of the new Basic commands is OPENUP, token value &AD. This opens a file for reading or writing. Basic I OPENIN is identical to OPENUP so they share this token value.

When a file has been opened in this way PRINT# can be used to write to the file and INPUT# for reading from the file. A more detailed description of the OPEN commands is given in Table I.

OPENIN on a Basic II micro only allows a file to be read. Since no equivalent exists in Basic I a new token value has been given to this keyword in Basic II - &BE.

This can present problems when programs are interchanged between the two Basics.

The rule for converting Basic II file handling programs to Basic I is to replace all of the OPENUPs with OPENIN. Basic I to Basic II conversions are not necessary, because the OPENIN on Basic I has the same token value as OPENUP when loaded on Basic II. Since both commands perform the same operation no alterations are needed.

The other new Basic command is OSCLI (Operating System Command Line Interpreter). This allows a string containing an operating system command to be passed to the interpreter (all operating system commands are

prefixed with a star).

For example, we're used to *TAPE selecting the tape filing system. In Basic II we could write this as OSCLI("TAPE"). This seems to be a roundabout way of doing things, but the advantage is that you can use variables rather than straightforward strings. For example, OSCLI(AS). More of this later.

Another advantage of using OSCLI instead of * commands is that any instructions following it are not ignored. This was previously one of the main drawbacks to using * commands.

Try *FX6,B:VDU2. It fails, since the variable B cannot be evaluated and also because the VDU2 statement cannot be put after the * command. OSCLI gets round this.

The OSCLI command consists of OSCLI followed by a string in brackets. The * is not necessary at the start of this string.

OSCLI can be simulated on Basic I. This is done by passing a string to a procedure which performs the operation. This procedure stores the string in memory, sets the 6502 X and Y registers to point to the string, and then calls the OSCLI routine at location &FFF7.

Here is an example of the OSCLI procedure being used to issue a *FX15 command in Basic I:

```
10 AS="FX"+STR$(15)  
20 PROCoscli(AS)  
30 END  
30000 DEFPROCoscli(string$)  
30010 $%700=string$  
30020 XX=0:YY=7  
30030 CALL&FFF7  
30040 ENDPROC
```

As mentioned previously, the operating system cannot evaluate variables. For example, a program to *LOAD the program DEMO1 at location &4000,

	OPENIN	OPENOUT	OPENUP
BASIC I	Equivalent to Basic II OPENUP. Read or write.	Write only. Identical in Basic II.	Not Implemented.
BASIC II	Read only. No Basic I Equivalent.	Write only. Identical in Basic I.	Read or write. Basic II only.

Table I

Get to know your augmented Basic II

where the filename and load address are held within variables, would seem to be:

```
10 file$="DEMO1":load%=4000
20 *LOAD file$ load%
```

But this program will not work on either version of Basic. You can't use *LOAD with a variable.

However if we are using Basic II the following program can be used:

```
10 file$="DEMO1":load%=4000
20 OSCLI("LOAD "+file$+"
+STR$(load%))
```

OSCLI can also be used to save repeating similar lines of * commands. For example, *FX 138 is used to insert a character into a selected buffer. The program to insert the message "HELLO !" into the keyboard buffer would normally look like this:

```
10 *FX 138,0,72
20 *FX 138,0,69
30 *FX 138,0,76
40 *FX 138,0,76
50 *FX 138,0,79
60 *FX 138,0,32
70 *FX 138,0,33
```

This can be tidied up by using the following OSCLI program:

```
10 string$="HELLO !"
20 FOR loop=1 TO LEN(string$)
30 OSCLI("FX 138,0," +
STR$(ASC(MID$(string$,loop,1))))
40 NEXT
```

The Basic I version is given in Program I. This uses the OSCLI procedure described earlier:

```
10 string$="HELLO !"
20 FOR loop=1 TO LEN(string$)
30 PROCoscli("FX138,0," +
STR$(ASC(MID$(string$,loop,1))))
40 NEXT
50 END
30000 DEFPROCoscli(string$)
30010 $%700=string$
30020 IX=0:YL=7
30030 CALL&FFF7
30040 ENDPROC
```

Acorn has made several other changes to Basic I to remove bugs and to enhance existing commands. A full review is beyond the scope of this article, but here are some of the minor changes with examples. Many thanks to Acorn for the information.

● ABS can be used with a unary minus

operator (the minus sign !). The following is only valid on Basic II:

```
10 PRINT -ABS(1)
```

In Basic I this would have to be:

```
10 PRINT -1*ABS(1)
```

● ASC":" can now be used in the assembler without confusing it. Program II causes a *Syntax error at line 40* on Basic I.

```
10 FOR pass=0 TO 3 STEP 3
20 PX=&B00
30 LOPT pass
40 LDA#ASC": "
50 JSR&FFEE
60 RTS
70 JNEXT
80 CALL&B00
90 END
```

● COUNT is re-set to zero when the screen mode is changed:

```
10 PRINT"ABCDEFGF";
20 MODE 1
30 PRINT"HIJKLMN";
40 PRINT COUNT
```

On Basic I the final display will be:

```
HIJKLMN 14
```

but the correct result should be:

```
HIJKLMN 7
```

● DIM P%-2 now produces an error message.

● EVAL will evaluate pseudo-variables such as PAGE, HIMEM and TIME. The following works on Basic II, not Basic I.

```
10 A$="HIMEM/256"
20 PRINT EVAL(A$)
```

● INPUT has been changed so that multiple entries can be separated by commas or semicolons:

```
10 INPUT A$,B$,C$
```

The semicolon cannot be used in this way in Basic I. Also the "label strings" in INPUT can be separated from the variable, as in Microsoft Basic.

However commas will do in both versions – so for compatibility stick to them!

● INSTR, within a procedure or function, fails on Basic I if the string you are searching for is longer than the string you are searching in. For example:

```
10 PROCdemo
20 END
30 DEFPROCdemo
40 PRINT INSTR("Super","Superman")
50 ENDPROC
```

Both versions of Basic print 0. Basic I also crashes out of the program in a peculiar way – it reports a null error followed by the message *at line 10*. This is because the shorter string has been left on the Basic stack.

● LOG, LN, SIN, COS and TAN have been made more accurate.

● ON ERROR GOTO 9999 now jumps to line 9999 and not the previous line.

● ON GOTO/GOSUB...ELSE can be used within functions or procedures.

● Fatal errors have been introduced. Errors with ERR 0 cause an ON ERROR OFF effect when they are being processed.

● STOP has been redefined as a fatal

GOLDEN rules for writing Basic I and Basic II compatible programs.

1. Use commas to separate multiple input variables and label strings. For example, use the following:

```
INPUT"Enter name ",A$
```

and NOT:

```
INPUT"Enter name ";A$
```

2. Don't use the OSCLI command, use the OSCLI call given earlier – it's more complex but works on both versions.

3. When using INSTR never assume that the string being searched is longer than the string you're searching for – check with an IF, first.

4. Be careful how you open files. If you are writing on a Basic I machine use OPENIN and never OPENUP. If you are writing on a Basic II machine use OPENUP and never OPENIN. OPENOUT is fine for both versions. If you stick to these rules the resulting program will run on whatever version of Basic is in the machine.



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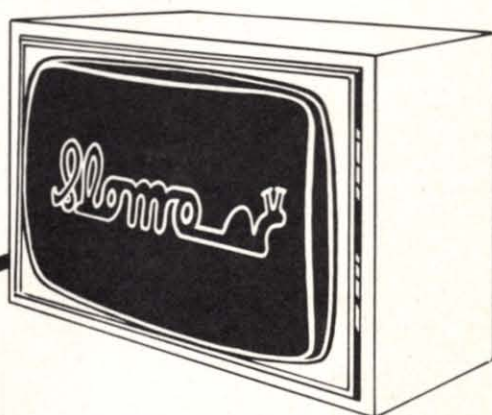
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61, Ditton Walk, Cambridge, CB5 8QZ

From Page 117

```

5 REM (C) The Micro User
10 H1X=500:H1#="THE BEEB":PROCDEF:
REPEATMODE7:PROCINSTR:MODE2:VDU23:820
2;0;0;0;:RESTORE:PROCNEW:PROCDEF:REPEA
T IFSTZ=TRUE PROCtune
20 PROCNs:PROCplay:*FX15
30 IFSTZ=TRUE PROCc1:SHZ=SHZ-1ELSE
SHZ=SHZMOD4:PROCB:PROCcd
40 UNTILL1Z=0:PROCDT:MODE7:PROCask
:UNTILGET$="N":END
50 DEFPROCnew:L1Z=3:SHZ=0:SCX=0:FX
=0:SAZ=218:STZ=TRUE:ENDPROC
60 DEFPROCns:IFL1Z=0ENDPROC ELSEXZ
=2:YL=28:CX(0,0)=250:CX(0,1)=250:CX(1
,0)=251:CX(1,1)=246:SAZ=SAZ-5:AX=SAZ:
CLS:FORTZ=0T015:COX(TZ)=TZ:NEXT:COX(9
)=1:COX(10)=1:COX(11)=1:COX(14)=2:COX
(15)=6
70 PROCoff:PROCAir:COLOUR132:COLOU
R3:PRINTTAB(6,0)"MINER BILL":COLOUR12
8:COLOUR1:PRINT SCORE:"HISCORE":
COLOUR5:PRINT$(SHZ):PRINTTAB(8,1):SC
XTAB(8,2):H1Z
80 COLOUR129:COLOUR3:PRINTTAB(0,4)
STRING$(20,CHR#224)TAB(0,30)STRING$(2
0,CHR#224)TAB(1,5)CHR#224TAB(18,5)CHR
#224TAB(1,29)CHR#224TAB(18,29)CHR#224
90 FORTZ=4T030:VDU31,0,TX,224,31,1
9,TZ,224:NEXT:COLOUR128
100 VDUS:FORTZ=1TOL1:BCOL3,8:MOVE8
31+TX*128,992:VDU250,8,10,251:BCOL3,1
5:MOVE831+TX*128,992:VDU250,8,10,246:
NEXT:VDU4
110 ONSHZ+1GOSUB120,160,220,260:7%F
E00=1:7%FE01=0:PROCIN:PROCcon:PROCS1:P
ROCpos:ENDPROC
120 PRINTTAB(5,9)STRING$(8,CHR#225)
TAB(16,13)STRING$(12,CHR#225)TAB(4,27)
STRING$(2,CHR#225):CX=0:FORTZ=17T029S
TEP2:CX=NOTCX:PRINTTAB(17+3*CX,TX)STR
ING$(2,CHR#225):NEXT
130 CX=0:FORTZ=17T029STEP2:CX=NOTCX
:PRINTTAB(17+3*CX,TX)STRING$(2,CHR#22
5):NEXT:COLOUR9:PRINTTAB(5,20)STRING$
(8,CHR#227)TAB(5,24)STRING$(8,CHR#227
):COLOUR6:PRINTTAB(16,29)CHR#245TAB(1
0,29)CHR#245
140 PROCcladder(13,7,5):PROCcladder(9
,11,8):FORBZ=6T026STEP2:COLOUR129:COL
OUR3:PRINTTAB(1,BZ)STRING$(2,CHR#224)
:COLOUR14:COLOUR128:PRINTTAB(1,BZ-1)S
TRING$(2,CHR#231):NEXT
150 COLOUR14:PRINTTAB(10,8)CHR#231T
AB(16,12)CHR#231TAB(16,20)CHR#231TAB(
14,13)"TAB(8,13)"TAB(7,24)":RES
TORE890:RETURN
160 PRINTTAB(5,25)STRING$(14,CHR#22

```

```

5):COLOUR6:PRINTTAB(10,24)CHR#245
170 PROCcladder(5,23,6):PROCcladder(2
,6,19):PROCcladder(7,6,8):PROCcladder(1
5,8,4)
180 FORTZ=10T026:COLOUR3:COLOUR129:
PRINTTAB(16,TX)CHR#224:COLOUR9:COLOU
R128:PRINTCHR#227CHR#227:NEXT
190 COLOUR14:PRINTTAB(18,10)CHR#231
TAB(17,15)CHR#231TAB(18,25)CHR#231:CO
LOUR129:COLOUR3:PRINTTAB(16,27)STRING
$(3,CHR#224+CHR#224+CHR#224+CHR#8+CHR
#8+CHR#8+CHR#10):COLOUR128
200 RESTORE940:COLOUR2:FORTZ=0T015:
READGX,HX:PRINTTAB(6X,HX)CHR#240:NEXT
:COLOUR9:PRINTTAB(5,14)CHR#227CHR#227
TAB(13,20)CHR#227
210 COLOUR14:PRINTTAB(6,19)CHR#231:
PRINTTAB(8,27)STRING$(8,CHR#232)TAB(8
,28)STRING$(8,CHR#232)TAB(8,29)STRING
$(8,CHR#232)TAB(11,24)CHR#232TAB(18,2
7)CHR#232:RESTORE900:RETURN
220 PROCcladder(11,7,7):COLOUR3:PROC
stairs(1,15,30):PROCstairs(-1,4,25):P
ROCstairs(1,15,20)
230 PRINTTAB(5,25)STRING$(10,CHR#22
5)TAB(5,20)STRING$(10,CHR#225)TAB(5,1
5)STRING$(10,CHR#225)TAB(5,10)STRING$
(10,CHR#225):CX=0:FORTZ=2T05:CX=NOTCX
:PRINTTAB(15+14*CX,TX*5)STRING$(3,CHR
#225):NEXT
240 COLOUR14:PRINTTAB(10,25)STRING$
(3,CHR#231)TAB(10,20)STRING$(3,CHR#23
1)TAB(10,15)STRING$(3,CHR#231)TAB(10,
10)STRING$(3,CHR#231):PRINTTAB(5,9)CH
R#231"CHR#231:PROCcon(2,7,16):D1Z=1
:COLOUR9:PRINTTAB(1,7)CHR#227
250 COLOUR3:PRINTTAB(11,15)CHR#225T
AB(11,10)CHR#225:PROCinv(7):RESTORE91
0:RETURN
260 PROCcon(7,20,5):D1Z=1:PROCcon(1
7,8,1):PROCinv(1):COLOUR14:PRINTTAB(5
,30)STRING$(10,CHR#232)TAB(1,7)STRING
$(18,CHR#232):COLOUR3:COLOUR129:RESTO
RE1140:FORTZ=0T010:READPZ,QZ,RZ:PRINT
TAB(PZ,QZ)STRING$(RZ,CHR#224):NEXT
270 COLOUR128:FORTZ=0T010:READPZ,QZ
:VDU31,PZ,QZ,225:NEXT:PROCstairs(-1,6
,13):RESTORE920:COLOUR14:PRINTTAB(7,2
2)CHR#231:COLOUR5:PRINTTAB(18,20)CHR#
235:RETURN
280 DEFPROCoff:FORTZ=0T015:VDU19,TX
,0;0;:NEXT:ENDPROC
290 DEFPROCcon:FORTZ=0T015:VDU19,TX,
COX(TZ);0;:NEXT:ENDPROC
300 DEFPROCdef:D1MCX(1,1),COX(15),S
$(4):CX=0:RESTORE1050:FORTZ=0T04:READ
S$(TX):NEXT:PROCdefchars:ENDPROC
310 DEFPROCcladder(XZ,YZ,PX)COLOUR4:
FORYZ=YZTOYZ+PX:PRINTTAB(XZ,YZ)CHR#22

```

```

6:NEXT:ENDPROC
320 DEFPROCin:VDUS:6COL3,7:MOVE64*X
Z,(31-YZ+1)*32:VDUCX(0,CX+1):MOVE64*X
Z,(31-YZ)*32:VDUCX(1,CX+1),4:ENDPROC
330 DEFPROCplay:RESTORE810:STZ=7+SH
Z:REPEAT:PROCAir:READPZ,DZ:IF PZ=0 SO
UND1,0,0,DZ-1:ELSE SOUND1,-9,PZ,DZ-1:
SOUND1,0,0,0
340 IFDZ=5:RESTORE810
350 MZ=0:X1Z=XZ*64:Y1Z=(30-YZ)*32+4
:FZ=(FZ+1)MOD2:PROCch:IFSTZ=TRUE GOTO
480
360 IFFZ=0ANDPOINT(X1Z,Y1Z-16)=8THE
NIFXZ+D1Z>0ANDXZ+D1Z<19PROCin:XZ=XZ+D
1Z:PROCin
370 DZ=INKEY(0):IFDZ=TRUE GOTO470
380 PROCin:*FX15,1
390 IFINKEY-980RDZ=90PROC1
400 IFINKEY-670RDZ=88PROCr
410 IFINKEY-730RDZ=58PROCu
420 IFINKEY-1050RDZ=47PROCD
430 IFINKEY-17:*FX210,1
440 IFINKEY-82:*FX210,0
450 IFINKEY-740RDZ=13PROCj(0)
460 CX=NOTCX:PROCin
470 IFINKEY-56:REPEATUNTILGET=82
480 UNTILSTZ<=0:SHZ=SHZ+1:IFSHZ=6SH
Z=5
490 ENDPROC
500 DEFPROC1:IFPOINT(X1Z-B,Y1Z+16)=
1ENDPROC
510 CX(0,0)=252:CX(0,1)=252:CX(1,0)
=253:CX(1,1)=247:MX=-1:XZ=XZ-1:ENDPRO
C
520 DEFPROCr:IFPOINT(X1Z+64,Y1Z+16)
=1ENDPROC
530 CX(0,0)=250:CX(0,1)=250:CX(1,0)
=251:CX(1,1)=246:MX=1:XZ=XZ+1:ENDPROC
540 DEFPROCu:IFPOINT(X1Z+8,Y1Z+60)<
>4ENDPROC
550 YZ=YZ-1:CX(0,0)=254:CX(0,1)=248
:CX(1,0)=255:CX(1,1)=249:MX=0:ENDPROC
560 DEFPROCD:IFPOINT(X1Z+8,Y1Z-8)<
>4ENDPROC
570 YZ=YZ+1:CX(0,0)=254:CX(0,1)=248
:CX(1,0)=255:CX(1,1)=249:MX=0:ENDPROC
580 DEFPROCch:POZ=POINT(X1Z+8,Y1Z-1
6):IFPOZ=0PROCj(4)
590 IFPOZ=14ORPOINT(X1Z+8,Y1Z+8)=14
PROCspat
600 IFPOZ=5COLOUR5:PRINTTAB(XZ,YZ+2
)CHR#236:COLOUR3:PRINTTAB(1,7)STRING$
(18,CHR#225)TAB(10,7)"SOUND2,2,10
0,10
610 IFPOZ=13PROCgot(X1Z,Y1Z-8):PROC
j(3)
620 IFFZ=0ENDPROC
630 IFPOZ=6PROCj(-2)

```


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```

640 AX=AX-1:IFAX=0PROCspat:ENDPROC
650 IFPOX=9COLOUR10:PRINTTAB(X,YZ+
2)CHR$228
660 IFPOX=10COLOUR11:PRINTTAB(X,YZ
+2)CHR$229
670 IFPOX=11PRINTTAB(X,YZ+2) " "
680 ENDPROC
690 DEFPROCj(OSX)SZ=OSX:IFSX=0PROC:
n
700 REPEATPROCin:SZ=SZ+1:IFSX<4ANDY
X>4YZ=YZ-1ELSEYX=YZ+1
710 CX=NOTCX:OSX=NOTOSX:IFPOINT(XZ*
64,(30-YZ)*32+50)=13PROCgot(XZ*64,(32
-YZ)*32-4)
720 IFSX=0ANDSX<8ANDXZ<18XZ
=XZ+MX
730 SOUND3,1,128-YZ*4,2:PROCin:UNT
LPOINT(XZ*64,(30-YZ)*32-12)<0:*FX15
740 IFSX<0OSX=NOTOSX
750 IFSX=0PROCin
760 IFSX=OSX:9PROCin:PROCspat
770 ENDPROC
780 DEFPROCtune:RESTORE:FORNX=0TO6:
READPX,DZ:SOUND1,-15,PX,DZ:SOUND2,-15
,PX,DZ:SOUND3,-15,PX,DZ:SOUND1,0,0,0:
SOUND2,0,0,0:SOUND3,0,0,0:NEXT:ENDPRO
C
790 DATA145,4,137,2,145,4,137,2,121
,6,137,6,149,8
800 DEFPROCspat:LIZ=LIZ-1:STX=TRUE
:COLOUR1:PRINTTAB(X,YZ) " TAB(X,YZ+
1)CHR$230:A=INKEY(100):ENDPROC
810 DATA129,4,145,4,157,4,157,4,165
,4,157,4,165,4,0,4,157,4,149,4,165,4,
157,4,149,4,165,4,0,5
820 DEFPROCc1 FORX=0TO80:IFX=0=1:
&FE01=X:SOUND1,-10,224-X*2,5:NEXT:EN
DPROC
830 DEFPROCc1 SCOL0,0
840 FORTX=0TO80:IFX=0=13:IFX=0=1:TX
:SZ=TX*16:MOVESX,0:DRWSX,1023:MOVESX
+8,0:DRWSX+8,1023:NEXT:ENDPROC
850 DEFPROCcd COLOUR7:CLS:PRINTTAB(
7,15)"Enter"TAB(10-LENS$(SHZ)/2,17)S$
(SHZ):FORTX=0TO32:G=INKEY(4):VDU19,7,
TX,0:NEXT:ENDPROC
860 DEFPROCpos COLOUR13
870 FORTX=0TO6:SHZ:READX1Z,Y1Z:PRIN
TTAB(X1Z,Y1Z)CHR$244:NEXT:ENDPROC
880 DEFPROCgot(PX,QX)VDU5:GCOL3,13:
MOVEPX,QX:VDU244,4:STX=STX-1:SCX=SCX+
100:COLOUR6:PRINTTAB(8,1):SCX:SOUND3,
-15,200,2:SZ=3:ENDPROC
890 DATA5,6,15,9,5,17,17,16,16,24,1
0,23,6,10
900 DATA5,6,5,10,17,26,10,20,15,6,1
3,19,8,19,11,9

```

```

910 DATA1,5,18,5,10,5,18,13,18,23,1
,14,10,27,13,22,13,12
920 DATAB,8,18,6,1,8,14,25,18,23,1,
15,10,28,18,8,13,13,10,10,4,10
930 DEFPROCair GCOL0,3:MOVE0,0:MOVE
0,20:PLOT85,AX*6,0:PLOT85,AX*6,20:GCO
L0,1:PLOT85,1279,0:PLOT85,1279,20:END
PROC
940 DATAB,8,15,7,6,20,7,20,8,20,9,1
7,2,26,7,14,8,14,3,8,4,8,9,8,10,9,11,
10,13,11,14,11
950 DEFPROCdt RESTORE960:FORTX=0TO8
:READPX,DZ:DX=DX+4:SOUND1,1,PX,DZ:SOU
ND2,1,PX,DZ:SOUND1,0,0,0:SOUND2,0,0,0
:NEXT:ENDPROC
960 DATA145,4,157,8,145,4,137,8,145
,4,149,4,137,4,145,4,129,8
970 DEFPROCinv(AX):FORTX=0TO15:COX(
TX)=COX(TX)EOR AX:NEXT:ENDPROC
980 DEFPROCask:IFSCX=HIX PROC: ELSE
PRINT "You scored"CHR$13"RIGHT$(1"000
00"STR$SCX,5)
990 PRINT "The highest score of Tod
ay is"CHR$129"RIGHT$(1"00000"STR$HIX,5
)"By"CHR$129"HI$
1000 PRINT "Do you want another game
(Y/N)?":
1010 ENDPROC
1020 DEFPROCb:GCOL0,1:FORBZ=AX*6TO85
TEP-8
1030 MOVEBX,0:DRAWBX,20:SCX=SCX+2:CO
LOUR6:PRINTTAB(8,1):SCX:SOUND1,-15,BX
/2,1:NEXT:ENDPROC
1040 DEFPROCstairs(SX,X1Z,Y1Z)FORTX=
0TO2:X1Z=X1Z+SZ:Y1Z=Y1Z-1:COLOUR3:PRI
NTTAB(X1Z,Y1Z)CHR$225:COLOUR14:PRINTT
AB(X1Z,Y1Z+1)CHR$231:NEXT:COLOUR3:END
PROC
1050 DATAThe Down Shaft,The Plutoni
um Store,The Ice Chamber,The Hot House
1060 DEFPROCinstr CLS:C$=CHR$131:FOR
TX=0TO1:PRINTCHR$141CHR$(129+TX)TAB(1
5)"Miner Bill":NEXT
1070 PRINT "C$ While looking abo
ut in his attic, "C$Bill has found
the map to an old secret"C$Diamond m
ine. The paper seems to be "C$gen
uine, so he finds the entrance and "
C$creeps in..."
1080 VDU23,8202,0,0,0:PRINT "
Z - Left"" X - Right"" :
- Up"" / - Down"" RETURN - Jun
p"" Q/S - Sound Off/On"" P/R
- Pause/Restart"TAB(17,14)CHR$136CHR$
129"Press any key to play"
1090 REPEATTX=0:REPEATTX=TX+1:PRINTT
AB(0,22)MID$(ME$,TX,40):TX=INKEY(7):U
NTILTX=LEN(ME$)ORNOTTX:UNTILNOTTX:END
PROC

```

```

1100 DEFPROC: PRINT "CHR$129CHR$141"C
ongratulations!!"CHR$129CHR$141"Cong
ratulations!!"CHR$131"Your score of
"RIGHT$(1"00000"STR$SCX,5)" beat the
old high "CHR$131"score of "RIGHT$(1"
00000"STR$HIX,5)" by "HI$ " !!!"
1110 PRINT "CHR$136"Please enter your
name:"INFUT""HI$:HIX=SCX:ENDPROC
1120 DEFPROCcon(X1Z,Y1Z,DZ)VDU5:FORT
X=0TO23:PROCP(64*(X1Z+TX),(31-Y1Z)*32
):NEXT:VDU4:ENDPROC
1130 DEFPROCp(X2Z,Y2Z)MOVEX2Z,Y2Z:GC
OL0,8:VDU233,8:SCOL0,15:VDU234:ENDPRO
C
1140 DATA5,25,2,2,28,4,13,19,2,8,10,
2,17,26,2,16,29,2,8,24,2,14,26,1,1,16
,1,17,11,3,1,9,1
1150 DATA5,15,6,15,7,15,10,16,11,16,
8,29,9,29,10,29,14,14,15,14,8,13,4,11
1160 DEFPROCdefchars
1170 VDU23,224,16,16,16,-1,1,1,-1,
23,225,-1,170,-1,68,68,-1,170,-1,23,2
26,66,66,126,66,66,66,126,66,23,227,-
1,-1,-1,0,0,0,0,23,228,0,-1,-1,-1,0
,0,0,23,229,0,0,-1,-1,-1,0,0,0,23,2
30,0,0,0,73,42,0,124,-1
1180 VDU23,245,0,0,-1,-1,66,66,129,1
29,23,244,0,124,198,186,68,68,40,16,2
3,240,-1,-1,-3,124,56,24,16,0,23,231,
0,74,202,140,84,60,56,16,23,232,63,67
,253,133,133,133,134,252
1190 VDU23,246,124,186,185,60,60,36,
36,54,23,247,62,93,157,60,60,36,36,10
8,23,248,92,94,94,76,60,60,60,24,23,2
49,60,60,60,36,36,100,4,6,23,233,0,0,
-1,-1,-1,-1,-1,1,23,234,0,0,51,102,5
1,204,102,204
1200 VDU23,250,0,0,56,60,56,16,56,12
4,23,251,124,124,56,56,40,40,60,23
,252,0,0,28,60,28,8,28,62,23,253,62,6
2,28,28,28,20,20,60,23,254,58,122,122
,82,60,60,60,24,23,255,60,60,60,36,36
,38,32,96
1210 VDU23,235,0,128,192,64,96,32,60
,126,23,236,2,2,4,4,8,8,60,126:ENVELO
PE1,1,0,0,0,0,0,126,-1,-1,-2,126,10
0:ENVELOPE2,2,1,-1,1,5,10,5,126,-1,-1
,-2,126,100
1220 ME$=STRING$(40,"")+"Miner Bill
... By Jason Chown...You are Bill,
travelling into the mine, gathering
Diamonds as you go... To get a Diamo
nd, jump on it... Watch out for Po
isonous Plants and Radioactive Waste.
.. Good Luck !!! "
1230 *FX10,8
1240 *FX9,8
1250 *FX11,20
1260 ENDPROC

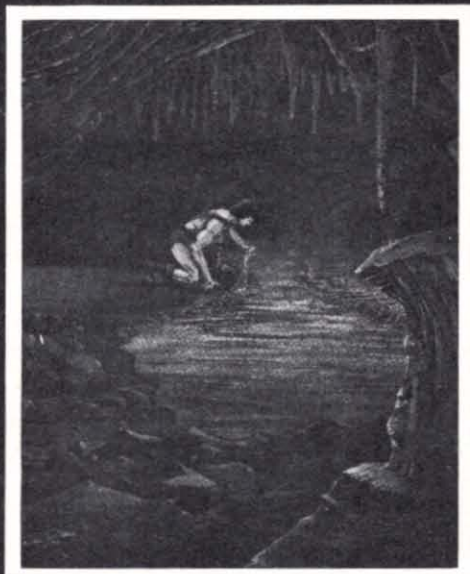
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This listing is included in this month's cassette tape offer. See order form on Page 237.

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Snowvaders listing

From Page 99

```

R#255
530 REIN$(0)=CHR#236+CHR#237+CHR#32
+CHR#236+CHR#237
540 REIN$(1)=CHR#238+CHR#239+CHR#32
+CHR#238+CHR#239
550 REIN$(2)=CHR#240+CHR#241+CHR#32
+CHR#240+CHR#241
560 REPEAT:VDU23;B202;0;0;0;
570 !B80=0:DEADZ=0:LEVELZ=0:OHITZ=0
:SCOREX=0:LIVESZ=3
580 REPEAT:REPEAT:IFDEADZ=-1 LIVESZ
=LIVESZ-1
590 FORAX=0TO7:S$(AX)=S$:NEXT
600 PROCvdu(LEVELZ)
610 FORAX=0TO4STEP4:V$(AX)=TV$:V$(A
Z+1)=BV$:V$(AX+2)=TS$:V$(AX+3)=BS$:NE
XT
620 LDOWNZ=-1:LEFTZ=20:XXZ=9
630 IFLIVESZ<0 GOTO750
640 CLS:PROCigloo:PRINTTAB(XX,27);S
A$
650 LZ=0:MX=3:DIRX=1:SHX=4:WIX=14:D
EX=10:DEPX=7:RXZ=-1:RTX=0:RPZ=LEVELZ*
10+20+RND(20):IFDEADZ=0 OHITZ=OHITZ+(
LEVELZ+1)MOD2:IFOHITZ>3 OHITZ=OHITZ-3
660 HITZ=OHITZ:DEADZ=0:PROCV:RESTOR
E3070:REPEAT
670 RPZ=RPZ-1:IFRPZ=0 RXZ=0
680 IFRXZ=-1 PROCreindeer
690 PROCmb:PROCmb:PROCmoveman
700 DOWNZ=0:IFLDOWNZ=0ANDFNR NDIRZ=
-1:DOWNZ=-1 ELSEIFLDOWNZ=0ANDFNL DOWN
Z=-1:NDIRZ=1
710 RXZ=FNR:PROCmb:PROCb:PROCmb:PROC
moveman
720 IFLDOWNZ DIRX=NDIRZ:IFLEVELZ>50R
RXZ=-1 MX=MX+1 ELSELZ=LZ+DIRX
730 PROCv:LDOWNZ=DOWNZ:PROCmb:PROCm
b:PROCmoveman
740 UNTILLEFTZ=0ORDEADZORLIVESZ<0
750 !B80=0:IFDEADZ PROCsplat
760 IFDEADZ=0 LEVELZ=LEVELZ+1
770 UNTILLEVELZ=12ORLIVESZ<0
780 IFELEVELZ=12ANDLIVESZ>0 CLS:COLO
UR1:PRINTSPC(5);"Well Done":COLOUR3:
PRINT"SPC(6)*You have""SPC(4);"succ
essfully""SPC(5);"beaten all""SPC(3
);"the snowvaders"":COLOUR1:PRINTSP
C(2);"Now try again !":LEVELZ=0:FORA
=0TO1000:NEXT
790 UNTILLIVESZ<0:MODE4:PROChighsco
re:PROCspc:MODE5:UNTIL0
800 DEFPROCvdu(NZ)
810 SZ=232:IFNZ<6 VDU19,2,CZ(NZ);0;
:ONNZ+1 GOSUBB90,950,1010,1070,1130,1
190:SZ=228:GOSUBB90:ENDPROC
820 ONNZ-4 GOSUBB90,950,1010,1070,1
130,1190,1250
830 SZ=228:ONNZ-4 GOSUBB90,950,1010
,1070,1130,1190,1250
840 VDU19,2,CZ(NZ-5);0;
850 TSZ=CHR#17+CHR#2+STRING$(4,CHR#
228+CHR#229+CHR#32)+CHR#228+CHR#229
860 BSZ=CHR#17+CHR#2+STRING$(4,CHR#
230+CHR#231+CHR#32)+CHR#230+CHR#231
870 ENDPROC
880 REM*SNOWMAN
890 VDU23,SZ,7,15,9,13,15,12,7,30
900 VDU23,SZ+1,224,240,144,176,240,
48,224,120
910 VDU23,SZ+2,62,127,126,126,127,1
26,62,31
920 VDU23,SZ+3,124,254,126,126,254,
126,124,248
930 RETURN
940 REM*TREE
950 VDU23,SZ,1,3,7,3,7,15,7,15
960 VDU23,SZ+1,0,128,192,128,192,22
4,192,224
970 VDU23,SZ+2,25,13,31,60,24,63,12
7,3
980 VDU23,SZ+3,48,96,240,120,48,248
,252,128
990 RETURN
1000 REM*TEDDY
1010 VDU23,SZ,24,39,41,27,30,12,7,11
1
1020 VDU23,SZ+1,48,200,40,176,240,96
,192,236
1030 VDU23,SZ+2,127,127,63,15,15,31,
60,56
1040 VDU23,SZ+3,252,252,248,224,224,
240,120,56
1050 RETURN
1060 REM*ROBOT
1070 VDU23,SZ,32,23,12,5,7,2,15,122
1080 VDU23,SZ+1,130,244,152,208,240,
32,248,175
1090 VDU23,SZ+2,127,106,111,74,31,40
,48,120
1100 VDU23,SZ+3,255,171,251,169,252,
10,6,15
1110 RETURN
1120 REM*STOCKING
1130 VDU23,SZ,0,0,0,0,0,0,0,0
1140 VDU23,SZ+1,124,108,84,108,84,10
8,84,108
1150 VDU23,SZ+2,0,0,1,62,85,106,85,6
3
1160 VDU23,SZ+3,84,172,84,172,84,172
,84,248
1170 RETURN
1180 REM*ESKIMO
1190 VDU23,SZ,7,15,16,18,8,28,99,160
1200 VDU23,SZ+1,192,224,16,144,32,11
2,140,10
1210 VDU23,SZ+2,160,160,96,19,14,26,
34,30
1220 VDU23,SZ+3,10,10,12,144,224,176
,136,240
1230 RETURN
1240 REM*SANTA
1250 VDU23,SZ,0,0,3,7,15,5,4,10
1260 VDU23,SZ+1,62,255,253,248,248,8
0,16,40
1270 VDU23,SZ+2,29,61,126,238,239,79
,7,14
1280 VDU23,SZ+3,222,217,189,185,126,
248,112,56
1290 RETURN
1300 DATA7,2,3,4,5,6,1
1310 DEFFNR:7&71=0:CALLRI:IF?&70=1 =
-1 ELSE=0
1320 DEFFNL:7&71=0:CALLLE:IF?&70=1 =
-1 ELSE=0
1330 DEFFNCHR(Q,R):VDU31,Q,R:AX=135:
ZX=USR(&FFF4):ZX=ZXAND &FFFF:ZX=ZXDIV
&100:=ZX
1340 DEFPROCigloo
1350 VDU23,255,28,62,255,255,255,255
,255,0
1360 REM LAND
1370 COLOUR3
1380 PRINTTAB(3,23);
1390 VDU244,245,246,247,248,32,32,32
,32,244,245,246,247,248,13,10
1400 VDU32,32,32,249,246,246,246,250
,32,32,32,32,249,246,246,246,250,13,1
0
1410 VDU32,32,32,246,251,252,253,254
,32,32,32,32,246,251,252,253,254
1420 PRINTTAB(0,29);STRING$(20,CHR#2
55);CHR#32;"LEVEL":CHR#32;CHR#17;CHR#
1;LEVELZ+1;CHR#17;CHR#3'CHR#32;"SCORE
";CHR#32;CHR#17;CHR#1;SCOREZ;TAB(13,3
0);STRING$(LIVESZ,SA$+CHR#11);
1430 VDU23,255,0,0,5,34,100,20,15,15
1440 ENDPROC
1450 DEFPROCmoveman:IFINKEY(-99) PRO
Cafire
1460 PROCmusic
1470 MXZ=0:IFINKEY(-98) MXZ=-1 ELSEI
FINKEY(-67) MXZ=1
1480 IFMXZ<0ANDXZ+MXZ>0ANDXZ+MXZ<19
PRINTTAB(XX,27);SP$:XZ=XZ+MXZ
1490 PRINTTAB(XX,27);SA$
1500 IFINKEY(-82)THEN*FX210,0

```


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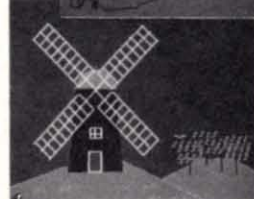
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From Page 198

```

1510 IFINKEY(-17) THEN #FX210,1
1520 IFINKEY(-102) JNGLEX=-1 ELSE IFI
NKEY(-86) JNGLEX=0
1530 IFINKEY(-68) FLSH=-1 ELSE IFINK
EY(-84) FLSH=0
1540 PROCmb:ENDPROC
1550 DEFPROCmb
1560 IFHX(1)=0 ENDPROC
1570 COLOUR1:CHX=FNCHEX(HX(0),HX(1)-1
)
1580 IFCHX(>32 GOTO1630
1590 PRINTTAB(HX(0),HX(1)-1);CHR$243
:HX(1)=HX(1)-1
1600 PRINTTAB(HX(0),HX(1)+1);CHR$32
1610 IFHX(1)=0 PRINTTAB(HX(0),HX(1))
;" "
1620 ENDPROC
1630 PRINTTAB(HX(0),HX(1));" ":IFCHX
>131ANDCHX<140ORCHX>147ANDCHX<159ORCH
X>139ANDCHX<146 ELSEHX(1)=0:SOUND&11,
0,0,0:ENDPROC
1640 IFCHX<147ANDCHX<159 HX(1)=HX(1)
-1:PRINTTAB(HX(0),HX(1));" ":HX(1)=0:
SOUND&11,0,0,0:SOUND&10,-15,4,3:ENDPR
OC
1650 IFCHX<139ANDCHX<146 PROCscoreup
(80*FNSCT1):SOUND&10,2,6,10:HX(1)=0:R
XX=-1:RTX=0:RPX=LEVELX+10+20+RND(20):
PRINTTAB(0,0):SPC(40):ENDPROC
1660 HITX=HITX-1:IFHITX>0 HX(1)=0:SO
UND&12,2,4,10:SOUND&11,0,0,0:ENDPROC
ELSE HITX=OHITX
1670 ARX=HX(1)-MX:ARZ=ARXDIV3*2+ARXM
OD3-1:CRX=HX(0)-LX+2:CRZ=CRXDIV2*2+AR
X=ARXDIV2*2:CH1$=MID$(V$(ARX),CRX+1,1
):CH2$=MID$(V$(ARX),CRX+2,1)
1680 IFCH1$=CHR$229ORCH1$=CHR$233 CR
Z=CRX-1 ELSEIFCH2$=CHR$228ORCH2$=CHR$
232 CRZ=CRX+1
1690 V$(ARX+1)=LEFT$(V$(ARX),CRZ)+CHR$
32+CHR$32+MID$(V$(ARX),CRX+3)
1700 V$(ARX+1)=LEFT$(V$(ARX+1),CRZ)+
CHR$32+CHR$32+MID$(V$(ARX+1),CRZ+3)
1710 CRZ=CRZ-2
1720 S$(ARX)=LEFT$(S$(ARX),CRZ)+CHR$
9+CHR$9+MID$(S$(ARX),CRZ+3)
1730 S$(ARX+1)=LEFT$(S$(ARX+1),CRZ)+
CHR$9+CHR$9+MID$(S$(ARX+1),CRZ+3)
1740 LEFTX=LEFTX-1:SOUND&10,2,6,10:S
OUND&11,0,0,0:IFFLSHX=0 GOTO1760
1750 FORA=0TO10:VDU19,0,1,0,0,0:FORB
=0TO10:NEXT:VDU19,0,0,0,0,0:NEXT
1760 PROCscoreup(10*(4-ARXDIV2)*FNSC
TI)
1770 PRINTTAB(HX(0)-1,HX(1)-2);CHR$3

```

```

2+CHR$32+CHR$32;TAB(HX(0)-1,HX(1)-1);
CHR$32+CHR$32+CHR$32;TAB(HX(0)-1,HX(1
));CHR$32+CHR$32+CHR$32
1780 HX(1)=0:ENDPROC
1790 DEFPROCfire
1800 IFHX(1)>0 ENDPROC
1810 HX(1)=26:IFRX=19 RXX=0
1820 HX(0)=XX:SOUND&11,1,252,34:ENDP
ROC
1830 DEFPROCv
1840 IFLX=-1 LX=LX+1:FORLOX=0TO7:V$(
LOX)=LEFT$(V$(LOX),2)+MID$(V$(LOX),4)
:S$(LOX)=MID$(S$(LOX),2):NEXT:WIX=WIX
-1
1850 FORLOX=0TO7
1860 IFMID$(V$(LOX),3)=STRING$(LEN(V
$(LOX))-2,CHR$32) V$(LOX)="":NEXT ELS
ENEXT
1870 IFV$(DEPX)="" V$(DEPX)=CHR$11:V
$(DEPX-1)=CHR$11:S$(DEPX)=CHR$11:S$(D
EPX-1)=CHR$11:DEPX=DEPX-2:DEZ=DEZ-3
1880 PRINTTAB(LX,MX);V$(0)
1890 PRINTTAB(LX,MX+1);V$(1)
1900 PRINTTAB(LX,MX+2);S$(1)
1910 PRINTTAB(LX,MX+3);V$(2)
1920 PRINTTAB(LX,MX+4);S$(3)
1930 PRINTTAB(LX,MX+5);S$(3)
1940 PROCmb
1950 PRINTTAB(LX,MX+6);V$(4)
1960 PRINTTAB(LX,MX+7);V$(5)
1970 PRINTTAB(LX,MX+8);S$(5)
1980 PRINTTAB(LX,MX+9);V$(6)
1990 PRINTTAB(LX,MX+10);V$(7);
2000 PROCmovebs
2010 ENDPROC
2020 DEFPROCb
2030 PRINTTAB(LX,MX);S$(0)
2040 PRINTTAB(LX,MX+1);S$(1)
2050 PRINTTAB(LX,MX+3);S$(2)
2060 PRINTTAB(LX,MX+4);S$(3)
2070 PROCmb
2080 PRINTTAB(LX,MX+6);S$(4)
2090 PRINTTAB(LX,MX+7);S$(5)
2100 PRINTTAB(LX,MX+9);S$(6)
2110 PRINTTAB(LX,MX+10);S$(7);
2120 PROCmovebs
2130 ENDPROC
2140 DEFPROCmovebs:IF?&81=0OR?&83=0
GOTO2170
2150 CALLMBLLTS:IF?&70=ASC("D") DEAD
X=-1 ELSEDEADX=0
2160 ENDPROC
2170 BX=0:REPEAT:BX=BX+1:AX=RND(WIX)
:UNTILAX<LX<190RBX>10
2180 IFBX=100RAX<LX>180RLX<2 ENDPROC
2190 BX=RND(2):IF?&81=0 QX=&80 ELSEI
F?&83=0 QX=&82

```

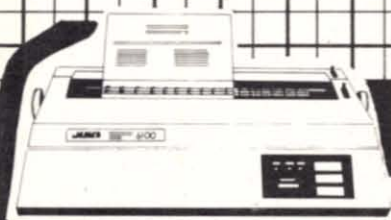
```

2200 ?QX=AX+LX:?(QX+1)=MX+DEZ+BX:END
PROC
2210 DEFPROCscoreup(UX)
2220 SCOREX=SCOREX+UX:PRINTTAB(7,31)
;SCOREX;:ENDPROC
2230 DEFPROCreindeer
2240 RPRX=ABS(RTX-2):RTX=(RTX+1)MOD4
:COLOUR1:IFRPRX=1 RXX=RX+1
2250 IFRX=19 RXX=-1:RPX=20+LEVELX+1
0+RND(20):RTX=0:PRINTTAB(0,0):SPC(40)
;:ENDPROC
2260 CUTX=RXX-14:IFCUTX<1 GOTO2290
2270 PRINTTAB(RXX+1,0);CHR$32;LEFT$(
REINH$,LEN(REINH$)-CUTX);TAB(RXX,1);C
HR$32;LEFT$(REIN$(RPRX),LEN(REIN$(RPR
X))-CUTX)
2280 ENDPROC
2290 PRINTTAB(RXX+1,0);CHR$32;REINH$
;TAB(RXX,1);CHR$32;REIN$(RPRX):ENDPR
OC
2300 DEFPROCmusic:PROCplay(0):ENDPR
OC
2310 DEFPROCplay(SX)
2320 CALLCLR:IF?&D00=0ORJNGLEX=0 END
PROC
2330 READ$=IFD$=""ANDSX=0 RESTORE3
070:GOTO2330 ELSEIFD$="" ENDPROC
2340 DX=EVAL("%"+D$):IFD$=0 SOUND3,-
10,DXMOD256,DXDIV256:SOUND3,0,0,0:END
PROC
2350 SOUND2,-15,DXMOD256-96,DXDIV256
*2
2360 SOUND3,-15,DXMOD256-48,DXDIV256
*2
2370 SOUND2,0,0,0:SOUND3,0,0,0:ENDPR
OC
2380 DEFFNSCT1
2390 IFLEVELX=100RLEVELX=11 TX=6
2400 IFLEVELX<10 TX=5
2410 IFLEVELX<8 TX=4
2420 IFLEVELX<6 TX=3
2430 IFLEVELX<4 TX=2
2440 IFLEVELX<2 TX=1
2450 =TX
2460 DEFPROCslat:=FX15
2470 RESTORE3090:XSX=XX*64-8:GCOL0,3
2480 FORPXX=XSXTOXSX+128STEP8:DX=0
2490 FORYY=92+64TO92STEP-4
2500 IFPOINT(PXX,YX)=1ANDDX=0 PLOT69
,PXX,YX+4:PLOT69,PXX,YX+8:DX=-1
2510 PROCplay(1):NEXT:NEXT:REPEAT:PR
OCplay(1)
2520 XPX=XSX+RND(16)*8:YYPX=92+RND(16
)*4
2530 IFPOINT(XPX,YYPX)=1 PLOT69,XPX,Y

```


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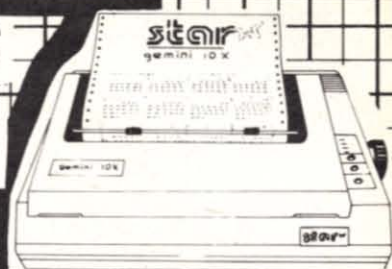
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From Page 200

```

#138
2930 BEQ ADD:RTN4:INC &71:LDA &71
2940 CMP &70:BNE LOOP4:RTS
2950 .ADD:INC &73:JMP RTN4:.PCK
2960 LDA &70:STA &71:ADC #10:STA &70
2970 LDA #0:STA &73:.LOOP5:LDX &71
2980 LDY &72:JSR REACHR:CMP #134:JSR
ADDC
2990 CMP #138:JSR ADDC:.RTN5:INC &71
3000 LDA &71:CMP &70:BNE LOOP4:RTS
3010 .ADDC:INC &73:LDA &73:CMP &74
3020 BNE RTN5:LDA &71:LDX &75:STA &8
0,X
3030 LDA &72:STA &81,X:INC &81,X:JMP
RTN5
3040 .CLR:SEI:LDA #128:LDX #248
3050 JSR &FFF4:STX &D00:CLI:RTS
3060 J:NEXT:ENDPROC
3070 DATA565,589,581,579,565,265,265
565,589,581,579,1460,560,580,589,581
1475,595,595,580,581,1489,565,589,581
,579,1465,560,580,589,581,560,560,56
0,580,589,581,595,595,595,595,595,595
,580,581,479,495,589,589,489,589,589,
489,589,595,779
3080 DATA281,1489,580,580,580,580,58
0,589,589,289,289,589,581,581,589,481
,495
3090 DATA589,589,489,589,589,489,589
,595,779,281,1489,580,580,780,280,580
,589,589,289,289,595,595,580,581,1479
,*
3100 DEFPROCinstr:RESTORE3440:READC$
:PROCTitles(E$)
3110 PRINTAB(16,7);"KEYS"SPC(7);"
";SPC(9);"-";SPC(9);"Left"SPC(7);"
";SPC(9);"-";SPC(9);"Right"SPC(7);
"SPACE";SPC(5);"-";SPC(9);"Fire"
3120 PRINT"SPC(7);"S";SPC(9);"-";S
PC(9);"Sound on"SPC(7);"Q";SPC(9);
";SPC(9);"Sound off"SPC(7);"F";SPC
(9);"-";SPC(9);"Flash on"
3130 PRINTSPC(7);"G";SPC(9);"-";SPC
(7);"Flash off"SPC(7);"M";SPC(9);"-
";SPC(9);"Music on"SPC(7);"N";SPC(9)
"-";SPC(9);"Music off"
3140 PROCcspc:ENDPROC
3150 DEFPROCtitles(D$):FORAX=1TOLEND
3160 DB$=MID$(D$,AX,1):IFDB$="M"VDU
42 ELSEVDU32
3170 NEXT:VDU5:GCOL0,1:MOVE144,988
3180 VDU242,10,10,242,4:ENDPROC
3190 DEFPROCcspc:PRINTTAB(9,30);"Pres
SPACE to continue";
3200 RESTORE3070:REPEAT:PROCmusic:UN
ILINKY(-99):#FX15
3210 CLS:ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 237.

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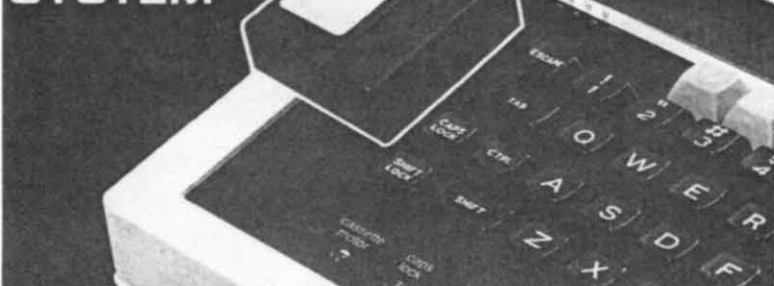
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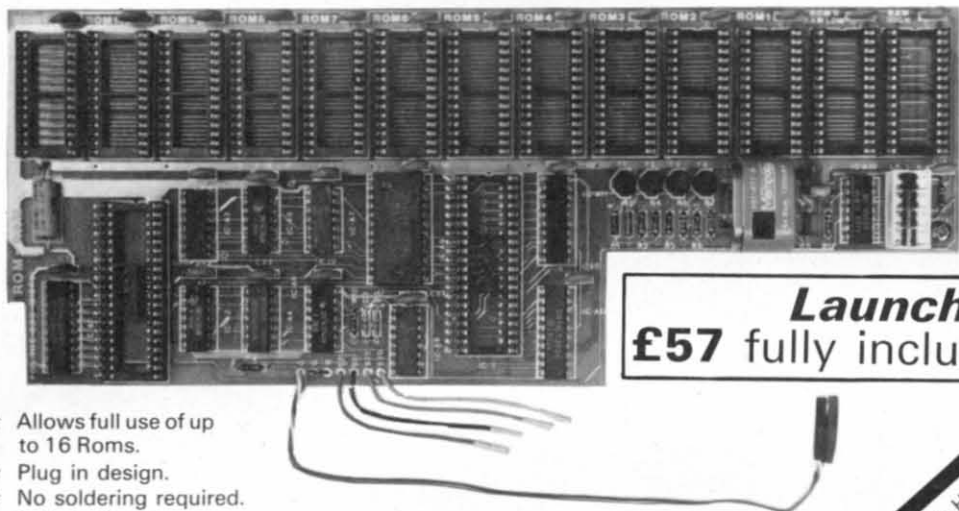
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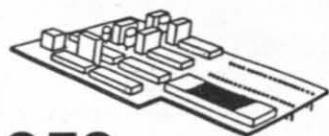
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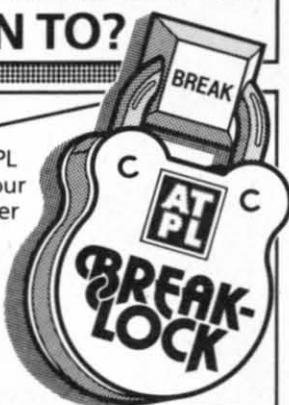
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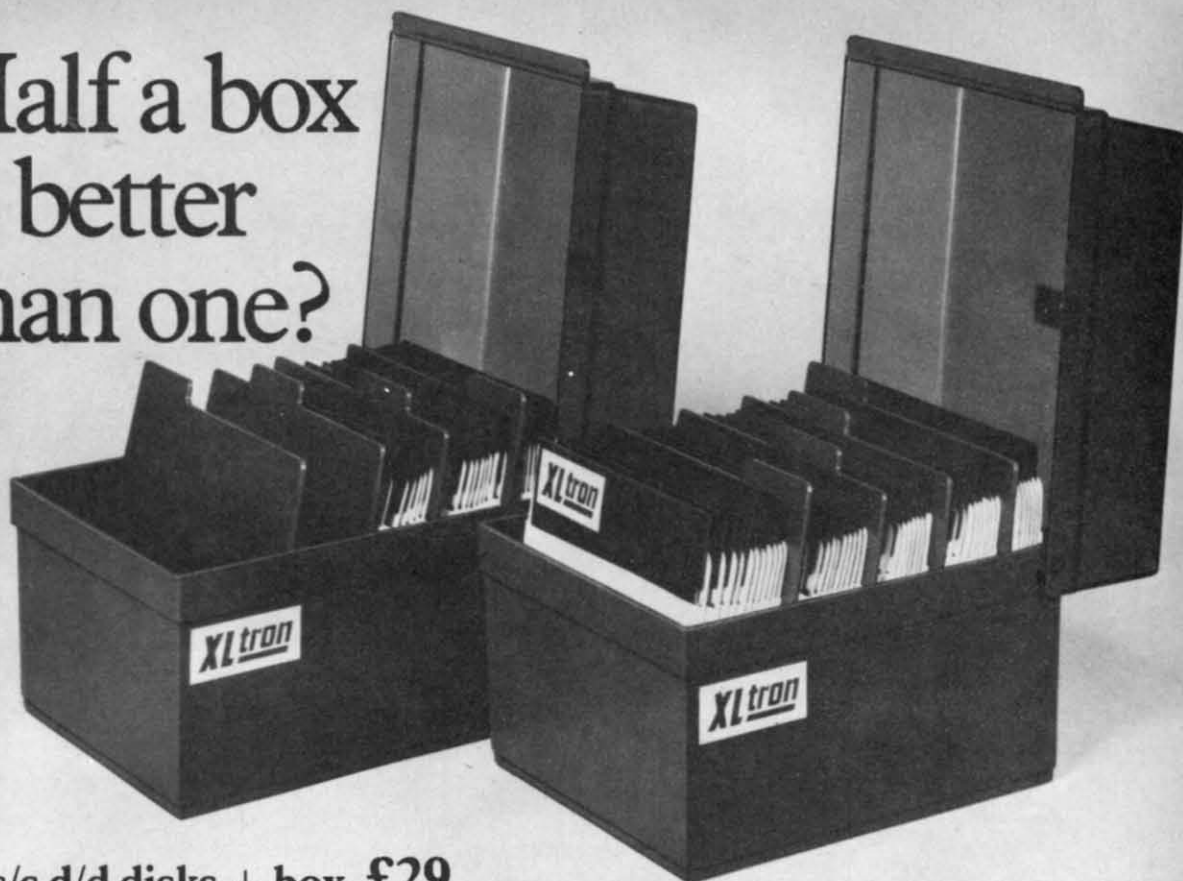
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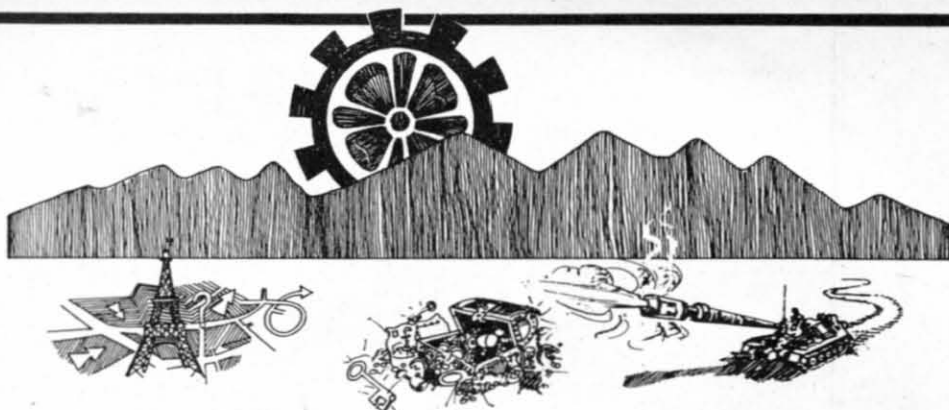
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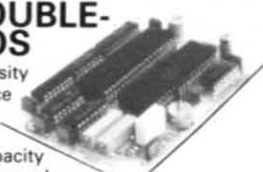
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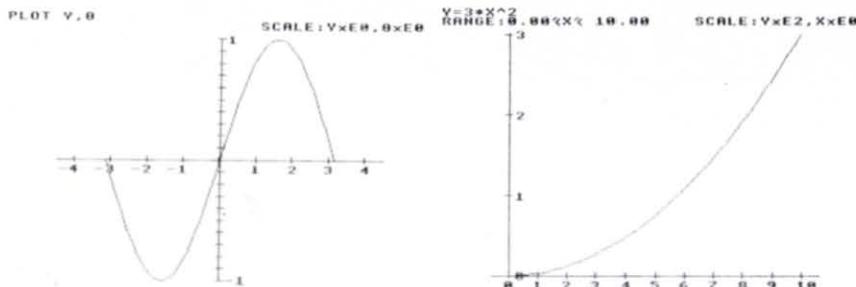
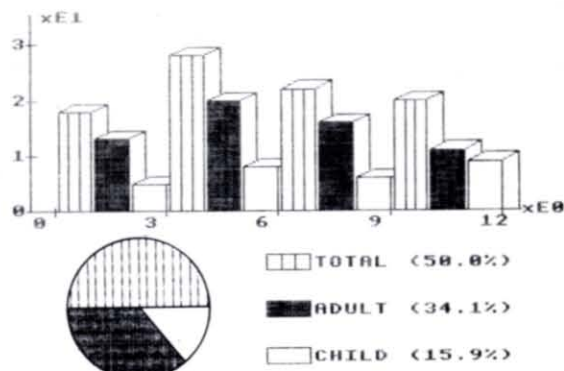
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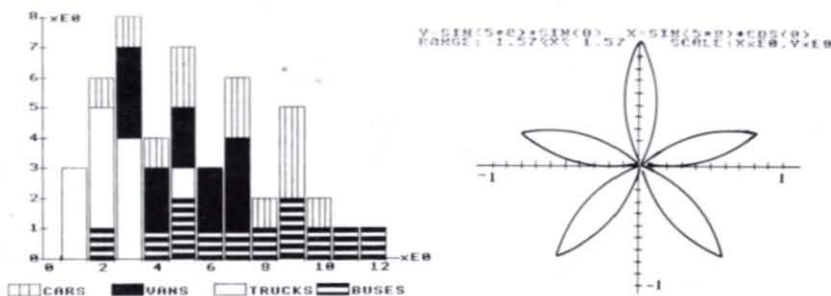
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MICROMAIL

Struggling for warp speed with the 6502

THE great attraction of the BBC B for most people is its well advertised expandability. The particular attraction, in my case, was the second processor capability.

As soon as the 6502 second processor became available and on the basis of all the rave reviews in all the magazines, including yours, off I shot to my local stockist to buy this wondrous beastie.

Ten weeks, a dozen sleepless nights, and nearly bald with perplexed scratching of my head, I have finally discarded the miracle machine.

Here I sit between the keys of my atrophied Acorn – once a mighty oak – to ask, Why, oh why did none of these reverent reviews reveal the big nasty – the second processor cannot cope with simple little disc errors.

Not satisfied with being unable to trap the errors, thereby ceasing execution, the clever little ***** gets really spiteful, and just hangs up on you.

Even the simple *.I, with no drive I connected, causes instant death. What it chooses to do with bad filenames or the dreaded OSWORD &7F is beyond mention in a good clean family magazine like yours.

The only cure is a hard break, and instant destruction of all those carefully entered records.

The nut factory initially blamed everything on the poor old disc doctor so having ripped the monster apart and removed all foreign bodies, I tremblingly applied the life giving force

(switched it on) thinking all my problems were over – alas no. *.I and the mighty oak became a dying fly.

Yet another expensive call to the nut factory, where plan B was revealed. The obvious solution was that my Beeb or its parasitic progeny was drastically ill, not caused by the disc doctor.

Thanks to the long suffering staff at Barbury Computers in Swindon I performed a very delicate brain transplant, removing the tumour and replacing it with a nice new healthy second processor.

I uttered the magic words "let there be light", but lo! there was verily a great darkness across the face of the VDU.

Undaunted and without a rest I wielded the scalpel once more, this time transplanting the body (BBC B).

Once more the ritual incantations were uttered, once more a fearful cry was heard from the wilderness: "Oh! ?\$*! it!".

Yet another phone call. By now I've spent enough to have bought a Unicorn. This time, after the symbolic "Hold the line while I discuss this with our engineers", the answer finally came back that this was apparently a feature of the

second processor.

Maybe the line was bad, or the engineer was unable to say f-a-i-l-u-r-e. But wait, poppa tree thinks it may be possible to call the IO processor from the parasite, turn off the parasite, perform the required ablutions, rekindle the great brain and RTS to my point of origin.

Mumbling grateful thanks, and truly awed by this show of equanimity on behalf of the inhabitants of Mount Olympus, I hurried off to attempt the miracle cure.

Stop! Think! We can't directly call the Beeb from the outside world. Never mind, just a minor oversight. We can always make an event of the whole thing, and do a little gate-crashing.

Intercept IRQV, no good, OK try BRKV, aha! slight success: EVENTV and just about every other V later, including the Harvey Smith variety, and having gone where no man has gone before, we are still stuck solidly on impulse drive, with no means of attaining warp speed.

Finally with my sanity in jeopardy, I must admit defeat, and being unwilling to lose a day's work every time I type a wrong file name, I have returned the poor crippled beast to the

aforementioned purveyor of processors, where it now lies awaiting a decision as to whether or not I get a refund.

This is currently destined for use towards a Z80 second processor, or if that proves to have equally silly problems, I'll use the money for something really useful like a ZX81 so that I too can control a power station.

By the way, this whole thing started when I decided to write a database program to keep track of such useful things as the articles in your excellent magazine, and such less informative things as said magazines reviews.

I decided that the program had to automatically configure itself to whichever drive system I was using at the time, and to whichever processor system was in use.

My solution now is to forget the processor options, thereby allowing the drive options to operate – of course I can no longer use the IO processor as a file cache. – A.P. Cook, Westlea, Swindon.

P.S. Led Zeppelin wrote a song about this letter, called Ramble On.

There's more to Basic II

I FOUND Tony Philip's article in the October issue of The Micro User about writing software for sideways RAM extremely interesting and instructive.

However he seems to be unaware that Basic II has a valuable feature that enables the code to be physically assembled and listed normally in the user RAM while encoding the correct addresses for its final location in the sideways area.

The method is to add four to the OPT numbers – thus setting bit 2 of OPT – and set 0% to the

Wanted – words on OSWORD

TWICE now your magazine has published articles concerning OSWORD &7F. As I do a lot of work on my Beeb in machine code, I found these very interesting, especially since there is no other information available on OSWORD.

However as there seems to be no end of commands for this OSWORD, please could you publish a complete data sheet for it, showing each valid command and the parameters it expects.

Also with the growing

number of second processor options available could you publish a table showing which service ROMs will work across the tube and which language ROMs will work in the 6502 second processor.

You might repeat this over a four month period with the intervening months having compatibility tables for hardware, disc based software

and cassette based software. – D.H. Lockwood, address supplied.

● There is nothing documented at the moment to cover the OSWORD calls. However we plan to rectify this in the near future in the form of an article. As for ROMs working over the tube, point taken. It's coming up.

MICROMAIL

From Page 217

chosen physical location of the code.

I chose to locate the code at &5B00 after moving HIMEM down to this address. In Mode 7 this would allow enough room for 8k of code to be stored above HIMEM.

The following alterations were made to the program as published.

Add a new line to read:

65 MODE7:HIMEM=&5B00

Alter line 90 to read:

90 FOR I%=4 TO 7 STEP3

Alter line 100 to read:

100 P%=&8000: O%=&5B00

After running the program the object code was saved with:

*SAVE RAMCODE 5B00+107

and later loaded into the sideways RAM with:

*LOAD RAMCODE 8000

As a further experiment, I tried doing this on a machine fitted permanently with Basic I, but having Basic II temporarily loaded into the same sideways RAM that I intended to use for Tony Philip's program. This works perfectly well.

The trick is to use Basic II until the code is assembled, then change to Basic I before loading the code into the sideways RAM.

The change can be made by selecting the Basic I ROM socket, or erasing Basic II from the RAM, or, as in my case, by using the read-inhibit switch I have with my sideways board.

The use of OPT in the way I have described was mentioned by Ian Birnbaum in a magazine article, although this did not mention that it applies in Basic II only. See also the Advanced User Guide, page 24. — C.W. Robertson, Maidenhead, Berks.

● Thanks for the comments. We're covering the differences between Basic I and II in a two part series of articles starting in this issue.

Normally we aim to make our assembler listings in Basic II, with if room permits, the Basic I adaptations. On large programs, though, space considerations force us to give the more general Basic I version.

Saving strings

I WONDER if any of your readers have had problems with deleting openout files on disc — the trick is to *ENABLE before you *DELETE or *WIPE.

Now I have a query which I cannot answer — please could you tell me how to save strings since typing PRINT#AS or something to that effect gives me the Type Mismatch error.

I do not have a User Guide, and have learned either from you or by trial and error.

Thanks for the magazine that knocks the Squirrel User head over heels! — Nat Smith (aged 12), Wilsden, Bradford.

● From your letter we can only assume that you have not opened and closed your files correctly. Once you have done so, you must include the channel number in the PRINT statement.

This PRINT#X,AS command should only be used when the file has been opened for output. If you can lay hands on a User Guide, refer to pages 188-193. Make sure all files have been closed before using *WIPE or *DELETE.

Ticking tip

I HAVE just received a Commstar chip from Pace — it is excellent.

While playing around with it I noticed an unusual but possibly useful quirk — if you exit from Commstar with *BASIC instead of the usual BREAK, the elapsed time clock continues to function.

It will tick away in Mode 7 until Break is pressed. I can't think of a use but somebody else might. — Kevin Crosbie, Cocker-mouth, Cumbria.

PS: Want to know a good way to mess up your Beeb? Just break the solder joint on the 100 ohm resistor in front of the ROM socket when you insert a chip. It gives you a cold shiver when you turn on and nothing works!

Super service

I WOULD like to publicise a recent example of honourable trading which has somewhat restored my faith in my fellow men, especially that body of them which prey on BBC Micro enthusiasts!

Having bought a Source Library Manager (SLM) ROM from Guardian Software, and been more than satisfied that it met both my needs and their description of the product, I was delighted to receive an unsolicited bonus from them.

This was another ROM entitled Text Library Manager (TLM), which complements SLM.

As Keith Watson, their proprietor, explains in his

accompanying letter, "we intend in future to advertise it as an integral part of the SLM package, and would not wish you to feel that you have been deprived in any way by your previous purchase of SLM".

I hope that other companies, who have been less considerate of their previous customers when an upgrade of their product has been produced, will note that in a close-knit group such as The Micro User's readership, word of a good performer gets spread as rapidly as that about the shark. — David B. Walsh, Kinnetles, Tayside.

● We're sad to say that such exemplary behaviour is all too rare among micro firms.

Into Overdrive

HAVING had Overdrive from Superior Software for some time now, I decided to delve into its workings.

The changes I made are too numerous to list here, but I have given two short alterations to give a more entertaining stage two.

Load overdrive as normal and once loaded press Break.

Set PAGE to &2300, (PAGE=&2300) and then delete line five.

Type the following:

```
6000 ?COL1%=1: ?COL2%=3: GCD
L0,5: PROCSKY: 6COL0,1: PROCCI
RCLE (120): PROCCLOUDS: PROCMO
UNT (1,9): RETURN
10100 DEFPROC MOUNT (C1,C2): F
OR I%= -4 TO 1300 STEP 50: 6COL0,C
2: MOVE I%, 600: R%=20+RND (60)+
1: MOVE I%+RND (20), 600: PLOTB
5,R%, 600+RND (90): 6COL0,C1: P
LOTB5,R%+RND (100)+20, 600: NE
XT: ENDPROC
```

Make sure the value of Top does not exceed &A79 by taking out all spaces. Owners of

Computer Concepts may use:

*SQ. S R

*EXC. CIRCLE CI G

if they wish.

Save the program as "OVER2". This may now be used as the second part of the whole program when loading. Finally, type GOTO 20.

If anything unexpected happens, rewind the tape, set PAGE to &2300, type RUN and start the tape. — J. Horsnell, Manor Park, London.

Beta-Base review

WITH reference to your review of Beta-Base in the September issue of The Micro User I think that the review correctly assesses Beta-Base as being a good buy but I would like to correct a few points.

Firstly, the transfer function requires no detailed explanation as it is menu driven and very simply an explanation would read:

- ☐ Which drive for destination file? (Enter drive number.)
- ☐ Enter file name of destination file. (Enter name.)
- ☐ Transfer search list (Y/N).

(Only asked if a search list is in memory.)

□ If a single drive is used the user is prompted to change discs as required.

As you can see the explanation would be boring in the extreme and simply repeating what is on the screen.

Your reviewer stated that he was unable to make the transfer option work. He is the only one out of over 3,000 users to have a problem. This leads me to conclude that your review was based on the pre-release version that we sent to you for information only.

Now to the good news. The points raised in criticism have been rectified in the enhanced version now on sale and a new manual and tutorial are included.

In addition to rectifying these points we have added many new features including global entry/edit/update, storage of calculations, spooling for Wordwise and View and full file specifications together with a procedure which will allow users to write their own utilities to access the data in their own specific way.

All for the same low price of £25.

These facilities were added at the request of users and the global facility is winning many friends in the education market. The spooler will allow the data to be formatted in many different ways prior to spooling.

Besides the major improvements we have also made some refinements to make life easier. We now believe Beta-Base to be the best value for money database on the market. Readers can obtain a full fact sheet upon request.

Existing users of Beta-Base can obtain the enhanced version by returning the original together with £3. — Dave Clare, Clares Micro Supplies, Northwich, Cheshire.

● Thanks for the letter, Dave. In defence of our reviewer we must point out that he did review the version you sent for review, not the pre-release version.

However this itself differed from the final version sold to the

public which, we are happy to report, functions very well indeed.

REM index

MAY I submit a programming idea which while not using obscure *FX calls is a practical long term aid in reminding you what that program you had laboriously typed out last year is all about.

It is to put in the first line a REM statement thus:

10 REM:MicroUser Oct84 p
ages 92 & 187

And in the magazine in question to note the program "NAME" and which tape or disc you have stored it on. — E.R.J. Chown, Taunton, Somerset.

● A good point. We're always telling people to REM programs thoroughly otherwise, believe it or not, when they come back to them they won't remember a darn thing!

If only we'd take our own advice...

Not to worry...

I READ the letter "Think it into submission" from fellow reader D. Ryder in the October issue of The Micro User with interest.

I believe that the disc drive units supplied by Pace are Teac drives in the FD55 series. I have an FD55F double sided 80 track unit and I would like to reassure Mr Ryder that his drive is working normally.

When a disc is inserted the indicator light does not come on but the motor starts running and does not stop until the lever is moved into the down position.

The reason for this I believe, is to ensure that the disc is exactly centred on the drive spindle.

Similarly, when the disc is removed the motor starts up in readiness for the insertion of another disc. If another disc is not inserted, however, the motor cuts out after about 10 seconds.

My drive behaves in exactly the same manner and

there is no risk of damage to the disc, so stop worrying, Mr Ryder. — D.J. Morley, Chiswick, London.

● Mike Cook confirms that he has since learned that what you say is correct.

Problems in Kenya

I HAVE only recently acquired a second-hand BBC system comprising Epson FX80, Microvitec 1441, Pace DS 80 track disc drive, a host of Computer Concepts ROMs, OS 1.2, Basic 1 and an Amcon DFS on an ATPL expansion board, a Voltmace keypad/joystick and about 30 games for the remarkably low price of £1,550.

This is in Kenya where the value when new is around £6,500. You can probably appreciate just how delighted I am.

I only discovered The Micro User shortly before buying the Beeb and had been receiving, and still do receive several other magazines.

I was about to order all the back copies of The Micro User when I received most of them as part of the package with my Beeb. I have since ordered and received the two issues that were missing.

It never ceases to amaze me that I can receive four magazines per month on the same micro and find something new in each of them. That this is the first time I have written to any of them must suggest, I suppose,

that I consider yours the most likely to give me some sensible answers.

Now for my questions:

1. The function keys are programmable on four levels. Are the shifted levels and so on programmed in a similar way as is shown on pages 141-143 of the User Guide or by having a utility program in the machine main memory?

If the latter, how do I make room for it when typing in long listings from magazines when I find it useful, quick and less error prone to place Basic keywords in these keys?

Can I program the shifted keys to produce keywords? Some may say it is easier to use abbreviated keywords but I prefer to see the full word on screen immediately.

2. Is there an error on page 439 of the User Guide and should it read "OSBYTE call with A=&E2(226) Set base number for <SHIFT>-function-key codes"?

3. Why oh why, if we have to put up with that apparently half empty second processor box adjacent to the Beeb, did Acorn not see fit to provide it with a numeric keypad, cursor keys, extra function keys and a second Return key?

This would have helped with Acorn's desire to promote the Beeb as a business machine. Is this technically feasible and could it be the subject of a future Body Building Course?

If not, are there any enterprising companies out there that are

Come back, Blogger

COULD you tell me how to get Blogger back after Break has been pressed?

Also could you tell me if there is a way to reach any screen you want to as is possible on Manic Miner for the Spectrum?

I have found some ways of getting other games back:

Snapper — CALL&645

Rocket Raid — CALL&67
New Snapper —
CALL&64

These work on my BBC model B (1.2 OS) so they should work on the Electron. — Paul Adams, Shelley, Huddersfield.

● Can anyone out there supply the necessary information?

MICROMAIL-

From Page 219

willing to produce a new lid for these boxes?

4. It seems to me that when the second processor is in operation there is an awful lot of redundant memory in the Beeb. There is the 16k ROM area normally occupied by Basic and at least 24k of RAM ignoring that required by the screen display.

Add these together and we have 40k of memory sitting around doing very little. Acorn don't seem to have made the most of an opportunity to put the Beeb back in the forefront of micro graphics.

Would it not be possible, with the aid of a RAM board similar to the Aries B20 and some clever software, to produce 40k of screen memory and therefore allow for a new Mode having 640×512 screen resolution?

As a system building designer I am particularly interested in high resolution graphics and this screen display would simply delight me. Anybody out there want to tackle that one?

Of course the same screen memory could be used to provide four colours in Mode 0, eight in Mode 1 and 16 in Mode 2. Imagine the games graphics that could be produced then!

5. Has the rumoured up-graded version of View been released and if so what improvements have been made?

6. Is there any way of locating second processor compatible, ROM based software in the

same area of memory as is occupied by Hi-Basic in the second processor?

7. Will Acorn ever produce ROM cartridges for the keyboard ashtray?

Please excuse the length of this letter and the number of questions but having no user groups out here one tends to feel a bit cut off. — **Alaister G. Copeland, Nairobi, Kenya.**

● Thank you for a letter which contained such interesting queries. We trust the following answers will assist you. Point by point then:

1. Shifted function keys cannot be programmed like unshifted ones. Only one set of multiple characters can be generated from these keys unless a machine code routine is written to allow additions.

Peter Walker described how this could be done in the February 1984 issue of *The Micro User*. In this article he described how single key entry can be achieved.

2. Quite right. The User Guide has printed &EA(228), which is incorrect.

3. What you ask is not feasible. There is only one connector between the BBC Micro and the second processor and all address space is used by the Tube. In the second processor there is no free address space. Mike Cook tells us that a key pad is on the cards for the user port.

4. A nice idea but not as simple as it looks. The space occupied by the Basic ROM is also used by all other sideways ROMs, for

example, the DFS. Therefore if you use this area sections of the screen will disappear when they are being accessed. Also the CRT controller will not handle any higher resolution while surrounded by the same electronics.

Finally the video ULA sorts out the unscrambling between a single byte and the bit width needed in the graphics mode, that is it translates 8 bits parallel to four sequential 2-bit words in Mode 1.

If you want Mode 0 with eight colours you can use an add-on board called Pluto which connects via the user port and printer output or 1MHz bus, and is available from I/O Research Ltd, London.

5. View 2.1 has been released and some of its improvements are print from memory direct, shortened commands, replace without regard to case, search/replace control characters.

6. At the moment we know of no relocation program to allow this. Try contacting the writers of the ROM software for information on a Hi version of the software.

7. We don't think so — but it can be used for extra vocabulary when using a speech synthesiser, available from Texas Instruments.

Gorilla repair kit

WE all make little mistakes like breaking things, dropping things

and pressing Break while playing Killer Gorilla.

Well, I've come up with a solution. Unfortunately it only applies to when you press Break on Killer Gorilla.

For all you Wallies who have pressed Break, simply type in:

CALL 8192

then press the space bar or fire and you're away.

The graphics may not be complete but still it's better than waiting a million years for it to reload on tape. — **Andy Kippers**

Blockbuster downloader

IN my program Blockbuster which you published in the November issue, I included an automatic downloader and a delete routine necessary for space reasons.

The downloader was to cater for disc owners and the delete routine was to remove the instructions once they had been read, as the space was needed for the game.

Having tested it on a colleague's micro with no DFS fitted, I realise that I was wrong to assume PAGE at &1900 in my downloader, and this causes problems to anyone who has PAGE set at a different address such as cassette users.

Can you help the readers who may experience similar problems by publishing either your standard downloader or preferably the enclosed alteration? — **Mark Melford, Saffron Walden.**

● Thanks Mark for your prompt letter. As a result we were able, at quite literally the last minute, to alter the published listing in an attempt to remove the problem.

We changed line 30 from *FX138,0,128 to *FX138,0,129 ignoring Mark's downloader, allowing a standard downloader to be used if necessary. However it will still execute the delete routine so it is imperative that you save your program before you run it.

Set up our standard

When scrolling needs software

COULD you tell me how to scroll a Mode 2 screen from right to left and not make it go up one line at the end of the scroll?

Also I would like to know how to get Mode 7 text printed out making a beep after every character, like a typewriter. — **Darren Virgo, Newcastle upon Tyne.**

● Unfortunately, it is not possible to scroll the screen in the way you require without

the display going up one line. This is due to the way the 6845 video controller works.

A possible alternative is to scroll the screen by using software. This will be very slow in Modes 0-2 and will require a machine code routine to do it.

When this program is run it enables the BBC to respond to a key being pressed with a beep.

To switch the beep on and

off use *FX14,2/*FX13,2 respectively.

```
10 code%=&70
20 P1=code%
30 ?&220=code% MOD 256
40 ?&221=code% DIV 256
50 [
60 LDA#07
70 JSR &FFEE
80 RTS
90 ]
```


downloader by typing in:

```
S*KEY0*TAPE MDX=PAGE-&E00:
FOR IX=PAGE TO TOP STEP4:
!(IX=0X)=!IX: NEXT: ?(TOP -
DX)=255:PAGE=&E00 MOLD MRUN
M
```

Save it. Run it. Load Buster then press F0 and the program should run normally.

As Mark points out the same result can be achieved by changing line 30 to:

```
30 *FX138,0,128
```

and changing line 1760 to:

```
1760 *KEY0 PX=PAGE:*TAPE M
FOR IX=0 TO TOP- PAGE
STEP4: IX!&E00= IX!PX:
NEXT MPAGE=&E00 MEND M
LOMEM=TOP M*FX138,0,129 M
```

Genlock circuit

REGARDING the letter about the video recorder in the September edition of *The Micro User*, there is no need for a genlock circuit because these are used to lock two video sources together so you can mix or chroma-key two sources.

Home videos will automatically lock to the incoming signal. As S. Taurins only wants to record a game, and not mix, he does not need a gen-lock.

If you do the modification to produce colour from the video output of the BBC Micro then feed this signal to the video input of the VCR, if it has one.

If you don't want to do all this, see Page 102 of the same issue of *The Micro User* and follow the

instructions in the first paragraph. Colour is on the next page.

Better luck next time Mike, from a soon to be BBC owner. — J. Jewell, Frettenham, Norfolk.

● This is fair comment. Mr Taurins original query was interpreted as a need to mix two signals together.

X marks the spot

MAY I point out to other readers that an error has been made in the Paged RAM article in the October issue of *The Micro User*.

The table in the centre of Page 78 contains a CMP#3 command. This should be the same as in the listing and replaced

with CPX#3. — Allan Batty, Glasgow.

● Thanks for bringing this to everyone's attention.

Garbage in, garbage out

YET more amazing discoveries and bugs on the BBC.Type:

```
PAGE=&E00 (CR)
NEW (CR)
```

Then type in a line 10 of 30 or more characters:

```
10 REM ANY NUMBER OF
CHARACTERS
```

and press return.

What next? — Christopher Hill, Bedminster, Bristol.

● Your little experiment has put

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MICROMAIL

From Page 221

garbage into the sound buffer, and what you are getting is – garbage out.

Data fields

HAVE you or any of the readers got any elegant ways of setting up inputting and processing specific data fields as in Cobol?

I would like to be able to enter date (-/-/-/-) or price (-/-/-/-) so that only legal information is accepted and no return is required at the end of the field. – M.J. Brand, Luton, Beds.

● Much of the information you require can be found in the article 'Not just another input routine', by Mike Stallybrass on Page 73 of the August 1984 issue of *The Micro User*.

Not on

I AM a avid reader of *The Micro User* and read with great interest the article on disabling Break in the November, 1983, issue.

I am writing a database type program. To finish and make it more professional I need a couple of programming problems solved. These are:

How can I make my program

break-in proof and how can the user load and run the program using LOAD and have a similar effect to CHAIN?

I have written my program in Basic. – P.J. Usherwood, Farnborough, Hants.

● The making of programs unbreakable we will cover in a future article. We are afraid your second request is not possible.

And finally, with tongue firmly in cheek . . .

Dear Trev,

That's it. I've had enough. I'm finished! I now formally announce that I have given up being a BBC Micro user.

After spending a whole weekend typing in Blunt the Rumpus I have reached my limit.

Exactly 30 seconds after I finally exorcised all my mistakes Andrea announced that she had sent off for the tape as a Christmas present.

"It'll save you typing it in", she said sweetly, closing the door just before the magazine reached her.

After a short time weeping I realised that the episode had summed up the whole of my relationship with the Beeb. It's been one of utter frustration, unbelievable humiliation and pain.

All those flagellating saints in the Middle Ages had it easy compared with us Beeb freaks.

So it was with a strange mixture of both guilt and utter relief that I decided enough was enough and switched off my micro for the last time. I must admit to a lump in my throat as the error messages disappeared from the screen.

Having said that, life without a Beeb is wonderful. I feel like I've come back to reality after a short but severe nervous illness.

To show I mean business I've cancelled my subscription to *The Micro User*. And the future seems marvellous.

No more reading Mike Bibby's beginners articles and saying "Well, I knew that anyway". No more reading through the Body Buildings for the funny bits and feeling inferior because I knew nothing about hardware.

No more reading Alice and wondering if I should be laughing (A. says

she's more puzzling than any adventure).

No more looking at the photo and wondering what Mike Cook's problem is. And no more fantasies about Kitty Milne.

Of course, like everything in life, it does have its drawbacks. I have to spend evenings with Andrea watching TV while she complains about the licence fee. (I haven't the heart to tell her that the licence isn't and that the fee paid for my unused wordprocessor. Clive says the micro puts up interference that blinds the detector vans so I'm safe).

Also, do you know anyone who wants to buy a soldering iron (unused) and an autographed photo of the *Micro User* team (with all the faces blacked out to protect the innocent?).

And then there's the Beeb to get rid of. No one seems to want it. I suppose the dints in the plastic put them off – a combination of Buster's claws and my forehead.

What really annoyed me was when A. gave Clive a huge pile of packages all wrapped in Christmas paper. As he hurried off up the drive, ignoring my yells, A. informed me they were my Christmas presents.

"They were all to do with your thing, so they're no use to you now".

I got a thankyou letter from Clive, full of puns on BREAKING the habit and ESCAPEing from it all. He told me the Rogues had put up a memorial plaque for me in the club room at the Rom and Buffer.

I even got a note from the *Micro*

User team (well, I think it was them, because there was no stamp). It read: "Dear Wally,

Sorry about your decision to go Beebless. We'd cancel your subscription but you haven't got one. Please send more coffee".

A. of course, tried to help. She gave our telephone number to MA – Micro Users Anonymous. They're a group of people who've been addicted to micros, broken the habit and have dedicated themselves to helping other unfortunates.

Their slogan is "Tell it to MA". I'd be more impressed if, when I phoned them, I'd heard a voice rather than a carrier wave.

Still I managed without a Beeb before Auntie Di did and I'll manage now, though how I filled my time I just don't know. As it is I've taken up jogging, though I was a bit disheartened when I heard A. tell Deirdre: "Bob's got jogging".

After trying to cross the High Street to get to the canal bridge I really feel for the frog in Croaker.

I even suggested going out with A. to her bellringing but she told me to "pull the other one".

I can live without my Beeb. It's just so boring.

Yours in ennui,
Bob

PS. It worked! A.'s finally cracked. She says she'll buy me a DFS and drives if I'll just stop bothering her and go back to playing with my thing. Happy Christmas!

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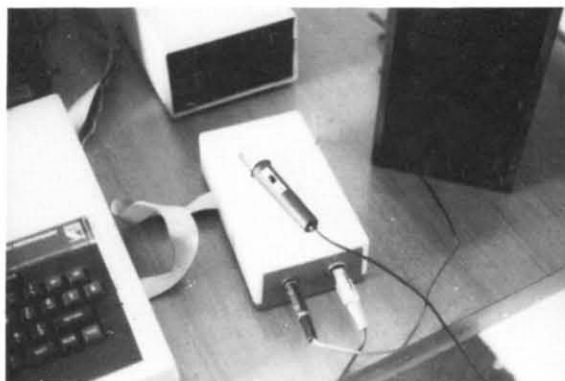
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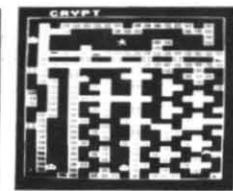
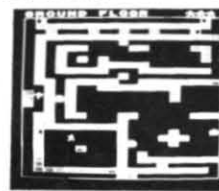
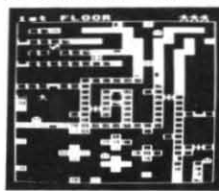
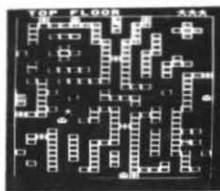
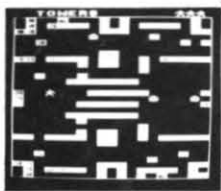
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- B) COLOUR BLOCKS bring sizes and colour into perspective.
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- D) FUNNY FACES presents a line up, which one is the suspect?
- E) FRED THE FROG needs co-ordinated help to get across the pond.

EARLY YEARS 2

- A) THE POND seems very active today
- B) SPEED is required to keep the cake on the conveyor belt.
- C) DIRECTIONS seem to be needed by everyone in Orion village.
- D) ORDER the blocks.
- E) SID THE SPIDER needs some help to get out of the maze.

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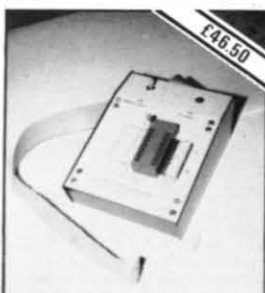
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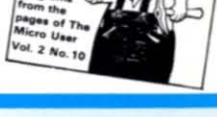
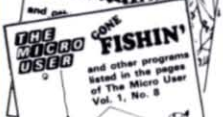
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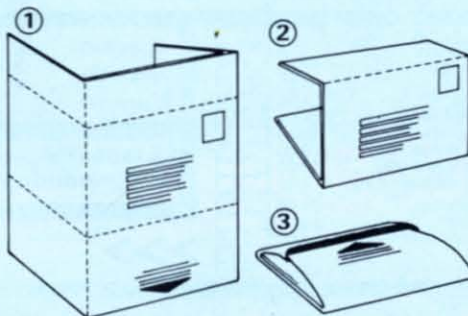
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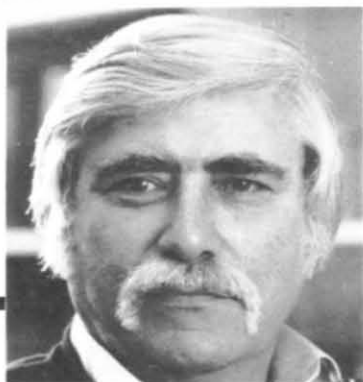
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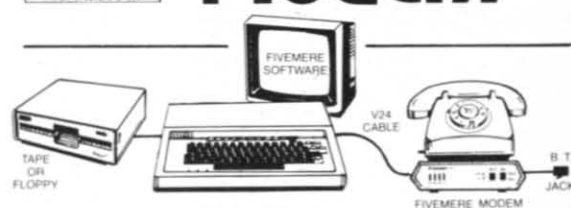
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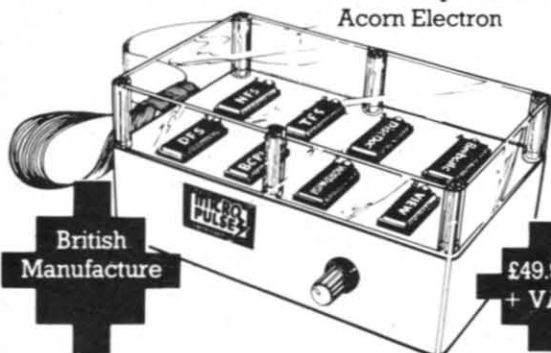
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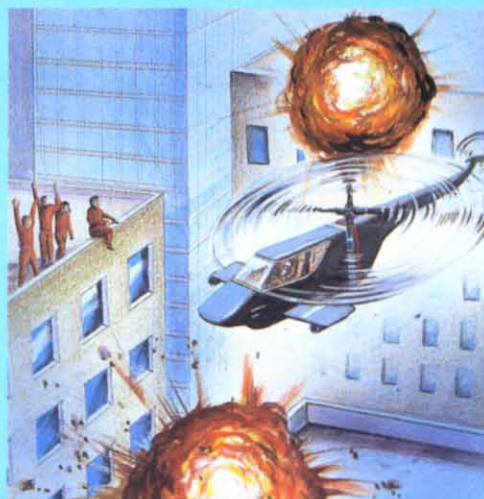
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